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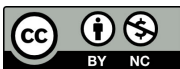


Preparing UTA students for careers in
research and teaching since 1990

University of Texas at Arlington
McNair Scholars Research Journal 2017

Volume 21

Preparing UTA Students for Careers in
Research and Teaching since 1990



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Message From the Vice President for Research

Duane Dimos, Ph.D.

As university education is essential to providing a strong foundation for the future of society, university research is vital to the discovery, invention, and innovation driving our world. UT Arlington's commitment to being *'The Model 21st Century Urban Research University'* is reflected in our strategic plan **Bold Solutions | Global Impact**. As a nationally-ranked research-1 university, our vision reflects the way in which education and research come together to meet the needs of our students and our community. The vision also highlights our strategic research areas and how they support the overarching goal of *'Global Impact Through Enabling a Sustainable Megacity'*, which is important to our region as the Dallas-Ft. Worth-Arlington metroplex heads quickly toward becoming a megacity.



Pursuing a PhD degree takes a lot of hard work and study, long hours of research, and tremendous dedication and persistence. The McNair Scholars Program plays an important role at UTA in providing the experiential learning to prepare promising students from low-income/first-generation or under-represented backgrounds for a successful transition to a PhD program. The program helps these students realize their dreams and ambitions by providing the academic support, mentoring and research opportunities necessary to become more competitive in applying for a PhD program and to be well prepared to start their graduate work.

The efforts that prepare students to earn a doctoral degree, which the McNair Scholars Program helps accomplish, establish a foundation for a lifetime of discoveries and contributions that will shape our future. These students will be the innovators and entrepreneurs who develop the technologies that transform the results of those discoveries into improvements in health, education, and economic growth.

The University of Texas at Arlington is proud to be a supporter of the McNair Scholars Program, which has provided opportunities to so many undergraduates over the last 30 years to help them reach their full academic and professional potential. Those of us who have been privileged to work with McNair Scholars and to witness the transformation from students to scholars are impressed with their sophistication and, as mentors, take great pride in their accomplishments. A special thanks to the faculty who have mentored them. At UTA, we are also proud to have several previous McNair Scholars from other institutions as members of our faculty.

Congratulations Scholars on your acceptance into the program. You have completed impressive work. It is work that portends an exciting future for you and for the promise your future contributions will make.

Notes From the Director

Joan Reinhardt, Ph.D

This year has been a bit more eventful than normal with the federal TRIO McNair Scholars Program grant competition and an exceptionally large contingent of summer research interns! McNair staff members were quite busy meeting the spring 2017 grant submission deadline and simultaneously planning for a very active summer of research. I am pleased that in both respects, things went well: we were funded for another five years and all eighteen research interns successfully completed their papers and presentations with the assistance of their mentors. Scholars are now preparing to attend conferences to share their work with their peers (at McNair undergraduate research conferences) or attend (and possibly present a poster at) various professional conferences. Many Scholars graduate this academic year and will soon take the GRE with the goal of starting graduate school in fall 2018. In addition to meeting the demands of senior-level classes, Scholars soon discover that the graduate application process requires considerable extra work. Applying to graduate school is a daunting task that requires strong organizational skills, good time management, and a correct understanding of what graduate programs seek from their applicants. At the same time, the UTA McNair Scholars program is recruiting new participants to enter the program in spring 2018 and, in most cases, to immediately prepare for research during the coming summer.



The underlying goal of the McNair Scholars program is to open the door to academic and professional opportunities for undergraduates from first-generation, low-income and/or underrepresented ethnicities (at the graduate level of study). Our services better prepare participants for timely and successful pursuit of the PhD and ideally a career in university research and teaching. In the 2017 edition of *The University of Texas at Arlington McNair Scholars Research Journal*, you will be able to share in the research of our eighteen summer interns, which includes a fascinating and varied array of projects. This journal reveals each year what talented and focused undergraduates can achieve when given the opportunity and the encouragement to do so.

In conclusion, I would like to thank the UTA leadership--President Vistasp Karbhari, Interim Provost Ronald Elsenbaumer and new Provost Teik Lim, Vice President for Research and Dean of the Graduate School Duane Dimos and Dean of the UTA Library Rebecca Bichel, in addition to other staff and faculty (including faculty on the McNair Selection Committee and faculty who served as mentors) for their commitment to the pursuit of excellence in research not only in this program but also throughout the university at large.

About the McNair Scholars Program

The McNair Scholars Program (officially known as the Ronald E. McNair Post-Baccalaureate Achievement Program) came to the campus of The University of Texas at Arlington in 1990. Created by the U.S. Congress in 1988, it is named after Dr. Ronald E. McNair, who perished with his fellow astronauts on the space shuttle *Challenger* two years earlier. The McNair program endeavors to assist talented undergraduates – either first-generation and low-income or underrepresented students – to prepare for graduate study leading to the Ph.D. and the professoriate.

Since its beginning at UT Arlington, the McNair program has encouraged and assisted over 300 students in various majors. Currently, it works with 34 students each academic year, providing seminars and classes on topics related to graduate school and the GRE, a May institute to heighten scholars' understanding of the culture of research, and a summer research internship. The program also provides guidance with the graduate school application process and travel funds to participate in conferences and visit prospective graduate programs. UT Arlington McNair graduates have subsequently earned masters and doctorates not only from their alma mater, but also from an impressive array of universities including Harvard, Indiana, Rice, and Southern Methodist, among others.

The McNair Scholars Program enjoys strong support from the UT Arlington administration and greatly benefits from the expertise and enthusiasm of both faculty and staff. Faculty members who serve on the McNair Selection Committee and those who act as mentors to McNair interns deserve special recognition. Members of the 2015-2016 Selection Committee include the following UTA faculty and staff: Dr. Karishma Chatterjee (Communication), Dr. Laureano Hoyos (Civil Engineering), Dr. Raymond (Joe) Jackson (Office of Graduate Studies), Dr. Zdzislaw Musielak (Physics), and Dr. Debra Woody (Social Work).



Dr. Ronald E. McNair
Scientist & Astronaut,
1950-1986

McNair Staff Members



Joan Reinhardt, Ph.D
Director



Cheri Counts
Admin. Assistant



Natalie Stephens, M. Ed.
Learning Specialist II

Scholarships

Kathryn A. Head Scholarship Winner

In summer of 2017 the Kathryn A. Head Scholarship for McNair Scholars was awarded to Arianna Gomez, a Social Psychology major engaged in a summer of program-sponsored research mentored by Dr. Lauren Coursey. Arianna was selected for this award based on her essay, GPA, outstanding letters of recommendation, and commitment to pursuing research and the professoriate. The scholarship honors the long and exemplary career of Kathryn A. Head, former director of the McNair Scholars Program and SOAR Learning Services. The scholarship committee includes Natalie Stephens, McNair Learning Specialist; Dr. Kayunta Johnson-Winters, Associate Professor of Chemistry and Biochemistry; Jennifer Luken-Sutton, Director of Student Support Services and Director of the I.D.E.A.S. Center; and Laura Wolf, Assistant Director of University Studies. We thank our committee members for their commitment to selecting the best candidate for this honor, and we congratulate Arianna on receiving it.



Left, Dr. Joan Reinhardt, McNair Scholars Program Director, and Arianna Gomez.

Friends of the UTA Library Scholarship Winners

In November, the annual Friends of the UT Arlington Library McNair Scholarship was awarded to Nicholas Prasatporn (Biomedical Engineering) and Meghan Lowrey (Anthropology) for their McNair research presentations and papers. The scholarship recipients are determined by the excellence of the Scholars' oral research presentations and papers, as assessed by members of the Friends McNair Scholarship Committee: Julie Alexander, Mary Castle, and Dr. Nancy Hadaway. For the second year, the McNair Research Journal is online, with the technical and financial support of the UTA Library. The online version of the journal includes the four top-ranked papers, those by the two scholarship winners as well as Miandria Davis (Psychology) and Arianna Gomez (Social

Psychology). All other McNair research interns share their results by having their abstracts published in the journal.

The McNair Scholars Program congratulates its 2017 scholarship winners and thanks the Friends of the UTA Library for their continued support. Special thanks to Rebecca Bichel, Dean of the UTA Library, and the current officers of the Friends of the UTA Library: Julie Alexander (president), Lynne Prater, (first vice president), Betty Clark (second vice president), Mary Castle (treasurer), Carol Lehman (secretary), and Melissa Deur (parliamentarian).



Left to right: Nicholas Prasatporn, Joan Reinhardt, Meghan Lowrey.

Social Media as an Employee Selection Device: Examining the Relationships between Social Media Attributes, Cognitive Ability, and Conscientiousness

Miandria Davis

Psychology Major



Mentor: Amber Schroeder, Ph.D.

Department: Psychology

Abstract

There is a limited amount of research that uses scientific measures to assess the validity of the cybervetting approach many employers take when inferring attributes from one's social media page during employee selection processes. Conducting a study that adds to the empirical literature involving this topic is of high importance, especially for further advancements in this field of study. The current study investigated the validity of the cybervetting approach in predicting job applicant conscientiousness and cognitive ability. More specifically, cognitive ability test scores and both self-reported and interviewer-based conscientiousness ratings were compared to various social media page attributes. It was hypothesized that grammar, spelling, and punctuation would be inversely related to both cognitive ability and conscientiousness, and that interviewer-based ratings of conscientiousness would be more closely aligned with these attributes than self-reported ratings. Study findings suggested that attributes on one's Facebook page (i.e., grammar, spelling, punctuation, and profanity) were not predictive of cognitive ability, but there was a link between spelling, punctuation, and profanity and interviewer-based conscientiousness ratings. Results also indicated that interviewer-based ratings of conscientiousness were more closely aligned to the social media attributes than self-reported ratings of conscientiousness.

Keywords: cybervetting, Facebook, conscientiousness, cognitive ability, grammar, spelling

Statement of Problem

In today's society, social media has a very prominent role in the lives of most individuals. Many individuals express themselves through various social media platforms, broadcasting their personal opinions about a multitude of things, like politics, gossip, or their employers. The striking appeal of social media has caught the attention of many, employers included (Priyadarshini, Kumar, & Jha, 2017). Some employers like to partake in cybervetting, which refers to "the practice of viewing social networking sites such as MySpace and Facebook, blogs and microblogs like Twitter, and using search engines like Google and Yahoo! to obtain information about job applicants or to monitor current employees" (Mikkelson, 2010, p. 2). According to the results of a 2015 survey conducted by the Society for Human Resource Management (SHRM), employee recruitment via social media is growing, with 84% of organizations currently using it for recruitment purposes, and 9% planning on using it in the near future for recruitment purposes. The survey also found that 43% of organizations use social media as a screening tool, and 44% agreed that social media could provide vital information about the job candidate's work-related performance (SHRM, 2016).

Thus, as cybervetting is a commonly used assessment tool, the purpose of the current study is to examine whether attributes on one's social media page are related to common characteristics that employers look for when selecting new employees. Conscientiousness and cognitive ability are two individual attributes that are particularly important, as they are two of the strongest predictors of job and academic performance (Chan, Schmitt, DeShon, Clause, & Delbridge, 1997). Conscientiousness, a dimension included in the Big Five personality model, has been demonstrated to be the strongest and most consistent dimension of the Big Five when it comes to predicting job performance (Barrick & Mount, 1991). One who possesses the trait of conscientiousness can be defined as being efficient, organized, reliable, responsible, and thorough (McCrae & John, 1992). Likewise, cognitive ability, which has conceptual overlap with the construct of intelligence, is defined as one's ability to execute higher mental processes of reasoning, remembering, understanding, and problem solving (Carroll, 1993). Cognitive ability can be measured using tests that assess verbal, quantitative, and technical aspects of cognition (Hunter, 1986).

The current study will examine the feasibility of estimating job applicant conscientiousness and cognitive ability using a cybervetting approach by examining grammar, spelling, punctuation, and profanity in social media posts and comparing them to cognitive ability test scores and conscientiousness ratings.

Summary of Scholarship

Previous research has revealed that selection for hiring purposes can indeed be based upon attributes on one's social media pages. A recent study revealed that job applicants with more visibly pleasing Facebook profile pictures obtained 38% more invitations

from recruiters to come in for a job interview, in comparison with those with pictures not as visibly pleasing, even when both job candidates had identical résumés and degrees (Baert, 2017). This study demonstrates that selection can be based on attributes present on one's social media profiles, specifically attributes linked to physical attractiveness.

In addition, Klumper and Rosen (2009) examined the feasibility of using attributes from one's social media page to obtain information about the individual. Their findings suggest that personality, performance, and intelligence can be assessed via cybervetting techniques (Klumper, & Rosen, 2009). In addition, empirical research has shown that one's conscientiousness ratings can be accurately assessed through various stimuli presented on one's Facebook profile (Darbyshire, Kirk, Wall, & Kaye 2016). Thus, these two studies suggest that various individual attributes can be accurately assessed from information present on one's social media page.

Contrarily, another study conducted on Facebook that assessed the validity of using social media to infer certain aspects about someone for selection purposes found that recruiter-based ratings of the job candidates' job performance, cognitive ability, conscientiousness, and other attributes based off of the job candidates' Facebook page were not related to the job candidates' actual job performance, cognitive ability, etc. (Iddekinge, Lanivich, Roth, & Junco, 2013). Thus, this study suggests that cybervetting via social media should be done conservatively. Additionally, many people feel that cybervetting violates individual privacy and can also be discriminatory (Davidson, Bing, Klumper, & Roth, 2016). Thus, more research examining the validity behind making hiring decisions based on the assessment of an applicant's social media page is necessary.

There have been various studies that have focused on language acquisition among children, as well as children with learning disabilities and how their grammar is affected by their disability. For example, findings from a study conducted by Ibbotson and Kearvell-White (2015) suggested that children with a more sophisticated set of cognitive and social skills were more capable of utilizing and comprehending the language acquisition process. Also, Barling and MacEwen (1991) found that women who reported cognitive difficulties (i.e., a lack of concentration or mental alertness) at their place of employment also had a difficult time identifying punctuation, spelling, and typographical errors when given a proofreading task, suggesting that cognitive attributes can affect one's awareness when identifying grammatical and punctuation errors. In addition, other researchers have used grammar and spelling tests to assess cognitive ability (see e.g., Chan et al., 1997). Thus we expect grammar, spelling, punctuation, and use of profanity on one's social media page to be associated with cognitive ability test scores.

Hypothesis 1: Cognitive ability test scores will be inversely related to the number of (a) grammatical errors, (b) spelling errors, (c) punctuation errors, and d) times profanity is used on one's social media page.

In addition, a study examining the association between dialect variation, grammar, and early spelling skills in children suggested that certain stimuli presented in verbal communication (i.e., features related to a sentence, which include information such

as gender and mood within the sentence) were associated with the proper spelling of inflections, with this association being mediated by children's oral production and reasoning of various forms of grammar (Terry, 2006). In this study, grammatical inflections were defined as extra letters added to a noun, verb, or adjective to express various tenses via different grammatical forms (e.g., wish, wishes). This suggests that acknowledging grammatical structure requires some form of cognitive reasoning, which then allows the correct spelling of words or inflections. This can be applied to adults, as well as children, since having cognitive reasoning to resonate grammar is a process used by both populations. Conscientiousness has been related to the use of profanity as well, as individuals with higher reported conscientiousness ratings had lower use of profanity (Kennison & Messer, 2017). Thus, we expect grammar, spelling, punctuation, and profanity on one's social media page to be associated with both self-reported and interviewer-based conscientiousness ratings.

Hypothesis 2: Self-reported and interviewer-based conscientiousness ratings will be inversely related to the number of (a) grammatical errors, (b) spelling errors, (c) punctuation errors, and (d) times profanity is used on one's social media page.

Furthermore, self-reported data can sometimes be biased due to a participant's lack of self-awareness or attempt at impression management. Impression management, which is also known as self-presentation, is the process in which one attempts to manage others' impressions with a particular goal or some form of attainment being the motivational factor (e.g., to get the job, to gain favor/empathy from others; Leary & Kowalski, 1990). Many factors can contribute to bias in self-reported data (Donaldson & Grant-Vallone, 2002). For instance, in a study that aimed to identify the best rating source for screening attention deficit hyperactivity disorder (ADHD) symptoms in adolescents, teacher ratings of symptoms were found to be more accurate and reliable than self-reported adolescent ratings (Young et al., 2009). Notably, a number of studies that use surveys to collect their data from participants require interviewers to also record observations of the participants (see e.g., Casas-Cordero, Kreuter, Wang, & Babey, 2013). Interview ratings are similar to the cybervetting evaluation process in that both processes are based on observations. Therefore, it would make sense that interviewer ratings would be more closely aligned to social media content than self-ratings because both have the common factor of observation. Thus, we expect that social media attributes (i.e., spelling, grammar, punctuation, and profanity) will be more strongly related to interviewer-based ratings than self-reported ratings.

Hypothesis 3: The number of (a) grammatical errors, (b) spelling errors, (c) punctuation errors, and (d) times profanity is used on one's social media page will be more strongly related to interviewer-based ratings than self-reported ratings of conscientiousness.

Significance of Research

Advancing research in the area of social media is of high importance because social networking websites are developing so rapidly. In addition, as mentioned earlier, corporations are starting to use social networking websites as employee selection devices more frequently. When something like this is done so spontaneously, there is always room for research to be done to see if what is being done has any validity. Researching whether cybervetting practices are supported by psychometric evidence would add to the scientific community tremendously because it is an enormous topic with hardly any research foundation.

Method

Participants

This study used archival data from 43 undergraduate students from a large southeastern university with classification ranging from freshman to graduate student. The mean age of the participants was 21.2 years ($SD = 2.9$), with 58.1% females, and 76.7% Caucasians. All participants were employed at least 15 hours per week with the same employer for at least the previous three months and had an active Facebook account.

Materials

The data obtained and utilized for the purpose of the current study were cognitive ability scores, both interviewer-based and self-reported conscientiousness ratings, and participant Facebook profile data. Each will be described in more detail below.

Cognitive ability scores. A shortened, 12-item version of the Raven's Advanced Progressive Matrices (APM; Bors & Stokes, 1998) was used to assess cognitive ability in the current study. The shortened version of the APM is particularly useful when the sampling pool consists of first-year university students (Bors, & Stokes, 1998). Items on the APM consist of analytical reasoning problems in the form of matrices. Problems on the APM can present vertically or horizontally, rotated or flipped, as added or subtracted stimuli, or as decreasing or increasing in size of the figure. In all cases, the bottom right corner of the matrix is left blank for the participant to determine which, out of eight answer choices provided, is correct. Scoring is based on the accuracy of the answer provided. A percentage of correct answers was computed to serve as the scale score.

Conscientiousness ratings. Conscientiousness was assessed using nine items from the Big Five Index (John, Naumann, & Soto, 2008) using a five-point scale (1 = Disagree Strongly and 5 = Agree Strongly). The stem for the survey used was "*I am someone who...*," and sample items included "*does a thorough job*" and "*can be somewhat careless*" (reverse coded). Scale scores were created by taking the mean of ratings across the nine items for both self-reported and interviewer-based measures. Cronbach's alpha for self-reported conscientiousness was $\alpha = .83$, and Cronbach's alpha for interviewer-based con-

scientiousness was $\alpha = .92$.

Facebook content. A screenshot of each participant's Facebook wall was used in the coding process.

Procedure

All Facebook profile content was coded by three raters. Each participant post was examined and coded for grammatical errors (e.g., incorrect word usage or sentence fragments), use of profanity, spelling errors, and punctuation errors (e.g., incorrect use of punctuation). Raters had to unanimously agree on all coded values before they were recorded.

Results

Hypotheses 1 and 2 were analyzed by examining Pearson's correlation coefficients (see Table 1). Cognitive ability was not significantly related to number of grammatical errors, $r = -.02, p = .88$, spelling errors, $r = -.19, p = .23$, punctuation errors, $r = -.13, p = .41$, or use of profanity, $r = -.14, p = .36$. Although these correlations were in the expected directions, these effects did not reach significance. Therefore, Hypothesis 1 was not supported. In examining Hypothesis 2, self-reported conscientiousness was not significantly related to grammatical errors, $r = -.22, p = .17$, spelling errors, $r = .12, p = .45$, punctuation errors, $r = -.20, p = .21$, or use of profanity, $r = -.16, p = .31$. Likewise, interviewer-based conscientiousness was not significantly related to grammatical errors, $r = -.23, p = .13$, but significant correlations were found between interviewer-based conscientiousness and spelling, $r = -.37, p = .01$, interviewer-based conscientiousness and punctuation errors, $r = -.50, p < .01$, and interviewer-based conscientiousness and use of profanity, $r = -.40, p < .01$. Thus, Hypothesis 2 was partially supported.

The third hypothesis was analyzed using Fisher's r -to- z transformations and using Steiger's (1980) equations for computing asymptotic covariance of effects. Correlations with grammatical errors, $z = -.10, p = .92$, and use of profanity, $z = -1.38, p = 0.17$, did not differ by the source of conscientiousness ratings; however, the correlations across rating source for spelling errors, $z = -2.73, p < .01$, did significantly differ, and there was a marginal effect for punctuation errors, $z = -1.82, p = .07$. In both cases, correlations with interviewer-based ratings were stronger than self-reported scores. As such, Hypothesis 3 was partially supported.

Discussion

The current study examined the feasibility of assessing job candidate conscientiousness and cognitive ability via a cybervetting approach. Grammatical, punctuation, and spelling errors, as well as the use of profanity were examined on participant Facebook

profiles and compared with participant cognitive ability and conscientiousness scores. Findings indicated that neither cognitive ability nor conscientiousness were linked to these attributes, which is contrary to the findings of previous studies (see e.g., Chan et al., 1997; Kennison & Messer, 2017). Notably, however, the relations were in the expected directions, but the relationships did not reach significance.

Study results also indicated that spelling errors were more strongly related to interviewer reports of participant conscientiousness than self-reported conscientiousness scores, and there was a similar marginal effect for punctuation errors on the participant's social media page. These findings are consistent with previous literature when it comes to interviewer ratings providing greater conceptual overlap with certain attributes being assessed in comparison with self-reported ratings (see e.g., Young et al., 2009). Grammatical errors and the use of profanity were not more closely aligned to interviewer's ratings of the participant's conscientiousness than self-reported conscientiousness by the participant.

The relationships between both conscientiousness and cognitive ability and attributes present on participants' Facebook pages were in the expected directions, but were not significant. Although these findings did not reach significance, this could have been due to the small sample size in the current study. More information should be gathered in order to truly determine if the hypotheses within the current study are supported. Thus, more research involving this topic is needed in order to arrive at any conclusions in relation to the nature of the relationships.

In addition, findings from the current study suggest that interviewer ratings had more similarity to content on the Facebook pages than self-reported ratings. This is of high importance because job candidates are screened by interviewers prior to coming in for an interview or being selected for hiring purposes. Interviewer-based ratings showing a higher rate of similarity demonstrates that the use of the cybervetting approach may be feasible, at least within the realms of the current study. Thus, it is possible that cybervetting could be conducted in lieu of an actual interview. More research is needed to support this proposition, but the findings regarding interviewer ratings versus self-reported ratings suggest this may be feasible. These findings also suggest that increased usage of the cybervetting approach could be beneficial for employers; however, the research is still limited, and cybervetting as a component of the hiring process should continue to be exercised with caution until more research is conducted.

Limitations and Future Directions

There were several limitations within the current study. One of the main limitations of the current study was the small sample size. More participants would have added power to the study, which could have potentially aided the results, specifically results that were marginally significant or approached significance. Notably, however, this study reported preliminary findings from a larger study, so larger sample sizes are anticipated in the future. Another limitation of the current study would be the sample pool consist-

ing of only students attending college. This is a limitation because this sample may be slightly different than a full-time employed sample. However, all study participants were currently employed, and the number of job interviews completed previously by the participants averaged was 1.95. Therefore, this helps increase the generalizability of these results. Another limitation would be using Facebook as the only social media platform within the current study, as employers may also examine other social media websites when cybervetting. However, this study provided a good first step by examining cybervetting using one of the most popular social networking sites (i.e., Facebook).

Future directions for researchers would be to examine study constructs using larger and expanded samples (e.g., full-time employees). Another suggestion for future research would be to assess additional social media attributes (e.g., examining the relationships of attributes on participants' social media pages and personality or discriminatory tendencies such as racism or sexism). Also, investigating social media platforms other than Facebook could help us better understand differences across cybervetting tools. Additionally, having more interviewer-based ratings of various attributes could be beneficial.

Conclusion

The current study assessed the feasibility of using a cybervetting approach in an employee selection context. Although not all hypotheses were supported, this may have been due to the small sample size. Nevertheless, this study helps to expand the literature on the validity of cybervetting and provides several suggested avenues for future research.

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Table 1

Means, Standard Deviations, and Intercorrelations among Participant and Facebook Attributes

	M	SD	1	2	3	4	5	6	7
1. Grammatical Errors	12.42	10.49	-						
2. Spelling Errors	3.95	5.56	.43**	-					
3. Punctuation Errors	21.93	17.85	.68**	.72**	-				
4. Use of Profanity	1.33	2.99	.22	.02	.20	-			
5. Self-reported Conscientiousness	5.51	.91	-.22	.12	-.20	-.16	-		
6. Interviewer-based Conscientiousness	4.97	.79	-.23	-.37*	-.50**	-.40**	.29	-	
7. Cognitive Ability	5.00	.61	-.02	-.19	-.13	-.14	.01	-.09	-

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

Understanding Attitudes Toward Pregnancy in the Workforce: A Focus on Personality

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Abstract

The purpose of this study was to examine bias against pregnant workers by correlating existing personality scales with a newly developed scale measuring attitudes toward pregnancy. Participants from an online crowdsourcing platform, Amazon Mechanical Turk (MTurk), answered a questionnaire that consisted of shortened versions of personality scales (Ambivalent Sexism Inventory (ASI), Bem's Sex Role Inventory (BSRI), Need For Closure (NFC), Right-Wing Authoritarianism (RWA), and Male Role Norms Inventory (MRNI)). This questionnaire consisted of a scale that broke down attitudes toward pregnant coworkers into three categories (hostile attitudes, benevolent attitudes, and egalitarian/accepting attitudes). At least partially significant results were found in every hypothesis predicted. Ambivalent sexism on the ASI, high scorings on NFC, high RWA, along with male alignment to toughness and dominance on MRNI were found to significantly correlate with hostile attitudes toward pregnant workers. Furthermore, ambivalent sexism on ASI, male alignment with masculinity on BSRI, and male alignment with toughness on MRNI significantly correlated with benevolent attitudes toward pregnant workers. Finally, female alignment to femininity on BSRI correlated with accepting/egalitarian attitudes toward pregnant workers.

Keywords: pregnancy in the workforce, negative attitudes toward pregnancy, personality predicts

Introduction

Researchers have long aimed to understand the wage gap between men and women (Crompton, 2006). Although there are likely many factors that contribute to wage disparity, research has focused on gender stereotypes as a potential source of gender discrimination in the workplace (Caleo & Heilman, 2013; DeLaat, 1999; Cundiff & Vescio, 2016; Bobbit-Zeher, 2011; Kantamneni, 2013). Gender roles dictate the stereotypical characteristics associated with both masculinity and femininity (Burnette, 2006; Potter, 2004; Diekman & Clark, 2015; Adler, 1994). Beyond being associated with women, femininity is often expressed in traits like gentleness and tenderness (Adler, 1994). These traits are often best seen fit for the traditional woman as the primary caregiver, and looked down upon in a work setting due to its competitive, or masculine, atmosphere (Masser, Grass, & Nestic, 2007). Thus, one key problem is that the stereotypical feminine role may be incompatible with the traditional employee role. For example, the connotations and feminine traits associated with “caregiver” were so obstinate that both males and females saw a wage depression when they took on the term (Bear & Glick, 2016), further implying a relationship between gender stereotypes and the gender bias in the workplace. While female wages made headway when women took on the masculine role as breadwinner, women experienced interpersonal aggression as a negative result (Bear & Glick, 2016). In fact, women who do not fit traditional or stereotypical feminine gender roles, specifically successful business mothers, were seen as less agreeable by other women (Benard & Correll, 2010), thus implying a negative attitude toward working mothers. The present study is novel because it explores how gender stereotypes could potentially impact coworkers’ attitudes toward pregnant employees.

Motherhood has possibly one of the most ruinous effects on a young woman’s career (Kahn, Garcia-Mangano, & Bianchi, 2014) because women receive a 5% wage depression per child (Correll, Benard, & Paik, 2007; Palley, 2016), or an overall negative wage consequence with every additional child on top of the already lower wages they receive compared with men (Avellar & Smock, 2003; Budig & Hodges, 2010). In the motherhood penalty, women with kids are not only viewed more negatively, they also receive less pay than women with no kids and are given less opportunities for promotion. Men, on the other hand, are often treated better and given more management opportunities in what is called the fatherhood bonus (Correll et al., 2007). Individuals may interpret “parenthood” in gender biased ways; even when the family roles tested were intentional-gender neutral (e.g., “parent” as opposed to “caregiver”), women with children were the only ones who were impacted negatively with lower wages and fewer opportunities (Bear & Glick, 2016). Women, consequently, must balance the expectations their gender role imposes on them as mothers and their role as a member of the workforce (Read, Crockett, & Mason, 2012). When women value family over power in the workplace they are forced to accept a lower peak in their pay (Lips & Lawson, 2009) suggesting that women cannot simultaneously be viewed as career minded and a good mother due to the conflicting stereotypes associated with each role. Since research suggests that pregnancy is viewed as a choice, the increased wage gap between mothers and women without chil-

dren is ultimately blamed on mothers for choosing family over their work (Baker, 2010).

Since pregnancy is the physical epitome of femininity, it therefore is likely that stereotypes of women are most salient during pregnancy. Pregnant workers may be seen as incompetent, needy, inflexible, and less committed due to their perceived inability to handle the demands of family and work (Morgan, Walker, Hebl, & King, 2013). This is especially true for women in traditionally masculine occupations, such as management, and in comparison with their childless female counterparts (Correll et al., 2007). For this reason, women have attempted to regulate their professional identities during pregnancy. Anticipating discrimination may keep women from revealing their pregnancy for as long as possible (Jones, 2016) since disclosing their pregnancy can often lead to increased interpersonal discrimination (Jones, et al, 2016). Coworkers with hostile attitudes may resent pregnant women because of their eligibility for time off and perceived inability to keep up with the workload, treating her with impatience and less warmth. Even coworkers who display benevolent reactions are often overly accommodating and cautious in a way that is essentially demeaning because it treats pregnancy like a disability (Hebl, King, Glick, Singletary, & Kazama, 2007). Given that pregnancy is difficult to conceal, it is likely that women experience stigma and bias prior to the birth of their child. Although much research has examined the motherhood wage penalty (Kahn et al., 2014; Correl et al., 2007; Avellar & Smock, 2003; Glauber, 2012; Budig & Hodges, 2007; Aranda & Glick, 2013; Abendroth, Huffman, & Treas, 2014; Molina & Montuenga, 2009), little is known about attitudes toward pregnant employees specifically. A study in 1993 looked into stereotypes that existed toward pregnant workers and how pregnancy had a negative effect on a worker's performance evaluations (Halpert, Wilson, & Hickman, 1993). This study will expand on the Halpert et al. (1993) study by attempting to find personality predictors of these negative stereotypes toward pregnancy in the workplace.

The purpose of this study is to analyze potential relationships between attitudes toward pregnant coworkers and pre-existing personality scales. By comparing specific beliefs, I seek to further understand individual differences in negative attitudes toward pregnant women in the workforce. Since prejudice toward women in the workplace is not a new idea, this study aims to expound upon earlier literature in a way that helps the workforce become more informed of the existing bias against pregnant workers. This study is the first to fully explore the nature of this bias against pregnant workers and personality predictors of bias, which called for the development of a scale to measure attitudes toward pregnant workers specifically. This scale breaks down attitudes coworkers of a pregnant employee may have. It specifically divides negative attitudes toward pregnancy in the workplace into hostile attitudes and benevolent attitudes. Hostile attitudes revolve around stereotypes that pregnant women are incompetent, inflexible, and unable to handle both pregnancy and workload. Benevolent attitudes stem from the belief that a pregnant employee requires assistance, both because her body cannot physically handle pregnancy and because she may need help staying up to date with her workload. This scale also looks at accepting/egalitarian attitudes toward pregnant coworkers. An individual with egalitarian attitudes believes that pregnant women are just as capable and

competent as any employee.

Understanding attitudes toward pregnancy through sexism. The Ambivalent Sexism Inventory (ASI; Glick & Fiske, 1996) was designed to measure the double-edged sword of sexism in hostile and benevolent reactions toward women. Hostile sexism is best defined as a general distaste for women in items such as, “Women are too easily offended,” and “Women seek special favors under the guise of equality.” Individuals who score high on benevolent sexism exhibit a pervasive fondness that quickly turns to aggression when women no longer abide by their gender role; thus, benevolence is an insidious, idealized perception of women who fill traditional feminine roles. Benevolent sexism is tested with items related to protective paternalism (e.g., “A good woman should be set on a pedestal”), complementary gender differentiation (e.g., “Women have a superior moral sensibility”), and heterosexual intimacy (e.g., “Every man ought to have a woman he adores”). Furthermore, individuals may experience both benevolent sexism and hostile sexism together in ambivalent sexism. Ambivalent sexist individuals can experience extremely negative and intensely positive attitudes in their response toward women’s conformity to feminine gender stereotypes (Glick & Fiske, 1996). By subtyping women who fall into traditional and nontraditional gender roles, ambivalent sexists can react with both hostility and benevolence depending on the situation (Glick, Diebold, Bailey-Werner, & Zhu, 1997). For instance, women who are nurturing and feminine are seen as “good” and are met with benevolence since they fall into the traditional gender stereotype and therefore comply with traditional relationships and power structures between men and women. Women who are ambitious and career minded are seen as “bad” and are met with hostility since they do not comply with the traditional gender roles and threaten gender relationships (Hebl et al., 2007; Glick et al., 1997). In fact, working mothers are perceived as less nurturing and less devoted to their family (Etaugh & Folger, 1998). Thus, pregnant women who continue to work may be perceived as violating traditional gender stereotypes. Accordingly, individuals who score high in hostile sexism are likely to denigrate pregnant workers for acting outside of their traditional role by continuing to work.

Hypothesis 1: Hostile and benevolent attitudes toward pregnant workers will be significantly correlated with ambivalent sexism.

Gender roles and attitudes toward pregnancy. Bem’s Sex Role Inventory (hereafter, BSRI) was designed to reinforce the idea that gender role identification is continuous, rather than categorical. Individual gender identification may vary by degree in terms of masculinity and femininity (Bem, 1974). Further, masculinity and femininity may be orthogonal, such that an individual could be neither masculine nor feminine (undifferentiated), or both (androgynous). The BSRI defines traits often associated with masculinity in self-reliance, having a strong personality, aggressiveness/forcefulness, and is often seen as a leader. Likewise, traits often associated with femininity include: gentleness, generally yielding, compassionate, and often has a love for children. An undifferentiated gender often implies that little to none of the traits associated with masculinity and femininity are endorsed by the person. Generally, those identified as androgynous display a response pattern in which both masculine and feminine traits are endorsed by the individual. Androgynous also implies well roundedness within the person along with increased maturity and conscientiousness (Bem, 1974). Gender-typing with BSRI has been

used to understand attitudes toward managers (Cuadrado, Garcia-Ael, & Molero, 2015). This study found that attitudes toward women leaders aligned with role congruity theory (Eagly & Karau, 2002) in that masculine traits were viewed as more appropriate for workplace leaders. Interestingly, it was also found that women, more than men, viewed their same-sex managers more positively than opposite sex managers due to in-group bias (Cuadrado et al., 2015). If attitudes toward managers is an extreme extension of attitudes toward coworkers, it can be expected that females identifying with femininity will view pregnant coworkers positively. It can also be expected that males identifying with masculinity will view pregnant workers negatively since pregnancy is an embodiment of femininity, and femininity is out of place in the work environment.

Hypothesis 2: High scorings of femininity on Bem's Sex Role Inventory in females will significantly correlate with high scorings of accepting attitudes toward pregnant workers.

Hypothesis 3: High scorings of masculinity on Bem's Sex Role Inventory in males will correlate with high scorings of both hostile and benevolent attitudes toward pregnant workers.

Pregnant women and unpredictability in the workplace. The Need for Closure scale (hereafter, NFC) measures an individual's intolerance for ambiguity and insistence on closure. Individuals scoring high on the NFC scale identify with a discomfort about uncertain situations or anything that they cannot predict (Roets & Van Hiel, 2010). Since, traditionally, women are expected to take on the role of primary caregiver, it is often expected that women will be less flexible upon the birth of their child and less dedicated to their workplace (Morgan et al., 2013). Furthermore, in an effort to meet the expectations of work and family duties, women may also adjust their family life and size (Read et al., 2012). Nonetheless, because pregnant workers may be perceived as less consistent or reliable, individuals who have a high intolerance for ambiguity may view pregnant workers with contempt.

Hypothesis 4: High scores on the Need for Closure scale will be significantly correlated with more of both negative attitudes (hostile attitudes and benevolent attitudes) toward pregnant workers.

Outgroup prejudice and pregnant workers. Right-Wing Authoritarianism (RWA) measures the degree to which individuals endorse strong authoritarian and conservative ideals (Altemeyer, 1998). These beliefs are often associated with hostile prejudice, specifically to outgroups (Haddock, Zanna, & Esses, 1993). While pregnant workers are not necessarily an outgroup, pregnant workers may still be treated as such because they defy the normal role associated with women. Though the need to work has ensured that mothers have been in the workforce for many years, working while pregnant and after the child's birth can still seem abnormal/non-traditional given the expectations imposed on women. It can therefore be expected that individuals scoring high on the RWA scale may express hostility toward pregnant women in the workforce for deviating from the norm by working and defying the traditional family values.

Hypothesis 5: High scores in hostile and benevolent attitudes toward pregnant workers will correlate with high scorings on the Right-Wing Authoritarianism scale.

Male role norms and negative attitudes toward pregnancy. While BSRI helps individuals clearly see which gender role they identify with, it cannot explore the complexities of male gender norms. For that reason, to further explore the relationship between negative attitudes toward pregnant workers and masculinity, the Male Role Norms Inventory (hereafter, MRN) will also be used (Levant, Hirsch, Celentano, & Cozza, 1992). The MRN breaks male role norms down into subcategories. Male roles restrict emotionality so as to deny pain and remain emotionally detached. Male roles also hold beliefs that males should be self-reliant through mechanical skills (men should have home improvement skills) and display negativity toward sexual minorities (homosexuals should never marry). Beyond that, male roles promote the avoidance of femininity (boys should prefer to play with trucks rather than dolls) and the importance of sex (men should always like to have sex). Finally, male norms are associated with beliefs about toughness (when the going gets tough, men should get tough) and dominance (a man should always be the boss) (Levant et al., 1992). Again, since pregnancy physically represents femininity, individuals, specifically males, who hold traditional male role beliefs may have negative attitudes toward pregnant coworkers. Of the beliefs in the MRNI, toughness and dominance will be most prevalent in the workplace among males because role congruity in the workplace demands masculinity and pregnancy (extreme femininity) may bring out the traditional gender role instincts to protect women.

Hypothesis 6: High scores on the Male Role Norms in men, specifically dominance and toughness, will significantly correlate with high negative attitudes toward pregnant workers, namely benevolent attitudes.

Method

Participants

Participants were recruited through an online crowdsource known as Amazon Mechanical Turk (MTurk), and were compensated sixty U.S. cents for their participation in the survey. MTurk, while newer than traditional methods of data collection is just as reliable. In fact, MTurk also has the ability to reach a more diverse demographic than traditional methods online and through universities (Buhrmester, Kwang, & Gosling, 2011). The final total of participants was 299 (118 females, 180 males, 2 other/decline to answer). Of the participants, 235 (78.6%) were from the U.S. while 64 (21.4%) were from other countries. While a majority of the sample, 254 (84.95%), were employed, 44 (14.72%) were unemployed. The breakdown of the participants' pregnancy status was 21 (7.02%) expecting a child and 276 (92.31%) not pregnant. The parenthood breakdown of the participants consists of 145 (48.49%) with no children, 85 (28.43%) with one child, 46 (15.38%) with two children, and 23 (7.69%) with three or more children. The participants were not selected based on their race and ethnicity, gender, or employment, but did

need to speak English in order to complete the survey.

Materials

All of the data in this study was analyzed using IBM SPSS Release 19.0.0.2. The following demographics were obtained but not used in the selection of participants: gender, age, race and ethnicity, country of birth, country of citizenship, employment status, and marital status. If applicable, demographics regarding employment industry and title, pregnancy status of participant or participant's spouse, and number of children were also obtained.

The online, self-report survey included an inventory to evaluate attitudes toward pregnancy in the workplace, developed for the study, along with existing, validated scales to assess ambivalent sexism, traditional sex roles, the need for closure, and right-wing authoritarianism. The order of the scales are listed in detail below.

Attitudes toward Pregnancy Scale. The 54 items in this scale are meant to measure attitudes toward pregnant co-workers along three dimensions (general negative attitudes, benevolent attitudes, and general egalitarian/supportive attitudes). The items were assessed by using a 6-point Likert scale with values ranging from 1 (*strongly disagree*) to 6 (*strongly agree*). All of the items in this scale were developed by the researchers of this study. In a prior study utilizing a similar sample, items were evaluated and revised and the three proposed factors were established via exploratory factor analysis.

Ambivalent Sexism Inventory. The 22 items were designed to measure hostile, benevolent, and ambivalent attitudes toward women (Glick & Fiske, 1996). The items in this study were measured on a Likert scale from 1 (*strongly disagree*) to 6 (*strongly agree*).

Bem Sex Role Inventory. The 12-item revised edition of the Bem Sex Role Inventory (hereafter, BSRI) was used to measure self-reported gender roles (Vafaei et al., 2014). The items measured four different gender roles (feminine, masculine, androgynous, undifferentiated) on a Likert scale with 1 (*never or almost never true*) to 7 (*almost always true*).

Need for Closure Scale. The condensed 15-item version of the NFC Scale was used to measure individual differences in a person's need for any answer over ambiguity (Roets & Van Hiel, 2010). Items were measured with a 6-item Likert scale 1 (*strongly disagree*) to 6 (*strongly agree*).

Right-Wing Authoritarianism. The abridged version of the RWA Scale consists of 15 items on a Likert scale 1 (*strongly disagree*) to 7 (*strongly agree*). This scale measures attitudes related to authoritarian submission, authoritarian aggression, and conventionalism (Manganelli Rattazzi, Bobbio, & Canova, 2007).

Male Role Norms Inventory-Short Form. The Male Role Norms Inventory-Revised (Levant, Hall, & Rankin, 2013) was used to measure male role norms along seven factors (restrictive emotionality, self-reliance through mechanical skills, negativity toward sexual minorities, avoidance of femininity, importance of sex, dominance, and toughness). The 21 items were measured with a Likert scale from 1 (*strongly disagree*) to 6 (*strongly agree*).

Procedure

Upon institutional review board approval, a link to the questionnaire, administered via Qualtrics, was uploaded to MTurk as a 300 person hit titled “Work and Social Attitudes” and was available from June 28, 2017 to June 30, 2017. The study was no longer available for participants to respond to after that time period passed. Participants gave informed consent at the beginning of the study, and were allowed to decline to answer any question at any point in the study. The order of the scales in the questionnaire were randomized for every participant. Participants were thanked and debriefed at the end of the study. After the debriefing, participants were given an MTurk completion code to redeem for their compensation and told they could contact a principal investigator if they had any questions. All the data was entered into SPSS and analyzed.

Results

The first hypothesis stated that hostile and benevolent attitudes toward pregnant workers should be correlated with ambivalent scorings. The sample for this hypothesis was analyzed with a Pearson’s correlation coefficient, showing significant results between ambivalent scorings and hostile attitudes toward pregnancy, $r(298) = .662, p < .001$. Significant results were also found between benevolent attitudes and ambivalence, $r(298) = .150, p = .01$. High ambivalent sexism was associated with high benevolent and hostile attitudes toward pregnant coworkers. These results fully support hypothesis 1.

The second hypothesis predicted that high scores on femininity on BSRI in females would correlate with accepting/egalitarian attitudes toward pregnant coworkers. Significant results were found using a Pearson’s correlation coefficient, $r(118) = .205, p = .026$. These results support the idea that femininity in females correlates strongly with egalitarian attitudes toward pregnant workers. High femininity was associated with high egalitarian attitudes toward pregnant coworkers. Hypothesis 2 was supported.

Further, a third hypothesis correlated both hostile and benevolent attitudes toward pregnant employees with masculinity scorings on BSRI in males. No correlation was shown using a Pearson’s correlation coefficient between hostile attitudes and masculinity, $r(180) = .084, p = .263$. However, the correlation between benevolent attitudes toward pregnant workers and masculinity in males was significant, $r(180) = .165, p = .027$. High masculinity was associated with high benevolent attitudes toward pregnant workers. The results partially support hypothesis 3.

The fourth hypothesis predicted that high scores on the NFC scale would significantly correlate with negative attitudes toward pregnant workers on both the hostility and benevolence subscales. While significant results were found when NFC was correlated with hostile attitudes toward pregnancy, $r(299) = .120, p = .038$, significant results were not found when NFC was correlated with benevolent attitudes toward pregnancy, $r(299) = .096, p = .097$. These results partially support hypothesis 4. As NFC increased, attitudes toward pregnant coworkers were more hostile.

A fifth hypothesis correlated high scores on RWA with hostile and benevolent attitudes toward pregnant employees. RWA was significantly correlated with hostile attitudes toward pregnant workers, $r(299) = .495, p < .001$. In contrast, no significant results were found when RWA was correlated with benevolent attitudes toward pregnant workers, $r(299) = .001, p = .987$. These results only partially support Hypothesis 5. Participants who scored high on RWA, endorsed hostile attitudes toward pregnant workers.

Finally, the sixth hypothesis stated that MRNI in males, specifically the dominance and toughness traits, would significantly correlate with benevolent attitudes toward pregnant workers. Significant results were found between toughness and benevolent attitudes, $r(180) = .165, p = .026$, but significant results were not found between dominance and benevolent attitudes, $r(180) = .082, p = .273$. Those who endorsed toughness traits in males were more likely to endorse benevolent attitudes toward pregnant workers. Hypothesis 6 was partially supported. Interestingly, when correlated with hostile rather than benevolent attitudes, toughness in males, $r(180) = .517, p < .001$, and dominance in males, $r(180) = .726, p < .001$, were significantly related to benevolent attitudes toward pregnant workers. Those who endorsed both toughness and dominance traits in males were more likely to hold hostile attitudes toward pregnant coworkers.

Discussion

The goal of this study was to find potential relationships between pre-existing personality scales and attitudes toward pregnant workers in hopes of better understanding the nature of the existing bias against pregnant workers (Morgan et al., 2013). Significant results were found between ambivalent sexism and negative attitudes toward pregnancy. This result was expected due to existing research findings that stated pregnant women would experience interpersonal discrimination due to employers and workers holding hostile and benevolent sexist ideals (Hebl et al., 2007). Thus, a composite of hostile and benevolent sexism, or ambivalent sexism, would be expected to yield similar negative attitudes toward pregnant workers. The findings of this hypothesis suggest that ASI can potentially be used as a personality predictor of negative attitudes toward pregnant employees.

Although slightly exploratory, female in-group bias toward same-sex managers (Cuadrado et al., 2015) led me to believe that women identifying with femininity on BRSI would exert the same in-group bias toward pregnant workers, especially since pregnant workers seem to embody femininity. The results supported this claim and suggested that females identifying strongly with femininity on BSRI is a reliable source for potentially predicting egalitarian attitudes toward pregnant workers due to a positive in-group bias. While it was expected that males identifying with masculinity on BSRI would yield significant results when correlated with negative attitudes toward pregnant workers, it was not expected that only benevolent attitudes would be significant. The present results suggest that male identification in masculinity on BSRI is potentially another reliable personality predictor of attitudes toward pregnancy, but only benevolent attitudes specifically. This is probably in part due to pregnancy playing more into a masculine stereotype

that men should take care of women. These findings could also be explained through the idea that pregnancy elicits an extremely feminine lens to view women through and therefore the belief that pregnant workers are not entirely a threat to a man's masculinity. Thus, pregnant workers are not deserving of hostile attitudes to masculine males despite their insistence on working.

Because of pregnancy stereotypes that pregnant women are no longer flexible with work duties because of eventual responsibilities to family, it was expected that high scorings on the NFC scale would correlate strongly with negative attitudes toward pregnant workers (Roets & Van Hiel, 2010). Although significant results were not found between benevolent attitudes and NFC, there were significant results between hostile attitudes and NFC. This belief may be explained by the perceived unpredictability that pregnant women possess and the nature of the reactions that individuals high in NFC may exhibit. For instance, pregnant women may pose such unpredictability that, in order for an individual high in NFC to ease their anxiety, they may rely on negative stereotypes and heuristics (Kossowska & Bar-Tal, 2013). Thus, it is easier to assume that pregnant workers pose a threat to a workplace through inconsistency than to wait out a pregnancy and assess the new mother's actual flexibility. These findings suggest that NFC scorings could potentially be used to predict negative attitudes toward pregnancy.

This study found a significant relationship between RWA and hostile attitudes toward pregnant workers. While it was expected that RWA correlated with benevolent attitudes toward pregnant employees would also yield significant results, no relationship was found. Because previous research has found a relationship between RWA and strong prejudices (Haddock et al., 1993), it is likely that RWA would only correlate with hostile, or blatantly negative, attitudes toward pregnant workers. These findings support the idea that RWA could also potentially be used as a predictor of negative attitudes toward pregnancy in the workplace, specifically hostile attitudes.

Lastly, toughness on the MRNI in males significantly correlated with benevolent attitudes toward pregnancy as expected. Items in toughness implied a toughness in men that could potentially trigger the stereotype that men should be protective of females. Consequently, high toughness scorings would yield high benevolent attitudes because of a pregnant woman's perceived need for protection and assistance. It was not expected that dominance on the MRNI in males was not significantly correlated with benevolent attitudes. Instead findings showed that dominance on the MRNI in males was significantly correlated with hostile attitudes toward pregnant workers. These results could potentially stem from the stereotypes about gender and power. As the dominance items on the MRNI suggest, men are meant to be more powerful (Levant et al., 1992). For this reason, working pregnant women may be met with hostile attitudes from men with high scores in dominance on MRNI because they are potentially viewed as a threat to men's power. While only partial support for the hypothesis was found, these results still suggest that the MRNI can potentially be used as a predictor of negative attitudes toward pregnant workers.

Limitations

One limitation in this study was the length of the questionnaire. Even with shortened versions of the pre-existing personality scales, participants were asked to answer more than 70 items. Although a few attention checks were part of the questionnaire, data in the study could potentially be invalid due to participants mindlessly checking boxes on items because of disinterest or low attention spans. In addition, the use of data collection through an online crowdsourcing platform posed another limitation. Together, these limit the amount of control I had over my participants as a researcher. While MTurk allowed for a more diverse demographic, I could not control for deliberate responses and potentially dishonest feedback.

Another limitation of this study was the use of the pregnancy scale, which has not been fully validated yet. This study was merely a step toward its validation and therefore its use posed some limitation in assessing the data. Furthermore, because this research was relatively exploratory, there was not much research to help guide my predictions.

Future Directions

Future directions for this study include a more in-depth examination of the relationship between personality scales (not assessed in the current study) and attitudes toward pregnancy in the workplace. Moreover, more research about the environments that correlate with these attitudes would be beneficial. For example, researchers could look deeper into different work industries that could potentially be related to these attitudes. For instance, looking into male-dominated and female-dominated industries may yield significant patterns in relation to these attitudes toward pregnancy.

Overall with a better understanding of the relationship between personality and the biases against pregnant women, the workforce could possibly better predict whether or not a bias exists on an individual level. Once enough information is gathered about the nature of these attitudes, researchers can potentially create an implicit association test to help individuals understand their own bias toward pregnant workers. By becoming aware that certain personality types may be more likely to hold hostile, benevolent, or any negative reactions toward pregnancy is another step closer to solving the inequality women still face in the work setting. Awareness through personality forces both men and women to address their own personal stereotypes with a deeper understanding of the nature behind these attitudes. Furthermore, this understanding can potentially be taken into anti-discrimination workshops to better inform the average employee and management of this existing bias.

Conclusion

The results of this study showed that personality scales ASI, BSRI, NFC, RWA, and MRNI can all be used as predictors of attitudes, specifically negative attitudes, toward pregnant workers. With these findings, we have a better understanding of the nature of

negative attitudes toward pregnant workers in the workplace. Thus, we potentially have a greater insight into one of the many explanations for negative attitudes toward women in the workplace, as well as into the question of why women with children tend to make less money than non-mothers and, especially, men (Palley, 2016). The wage gap between men and women, the inequality, can never be fully addressed if discrimination against pregnant women, the embodiment of femininity, prevails. This research adds a novel look into this negative bias with the use of a newly developed scale to measure attitudes toward pregnancy in correlation with personality scales.

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Consequences of Abortion Legislation Changes for Women in the Rio Grande Valley: A Qualitative Analysis

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Abstract

Abortion legislation in Texas has changed significantly since the passing of HB2 in 2013. While certain abortion restrictions enforced by HB2 were struck down by the Supreme Court in 2016, effects of its enforcement still linger. An additional antiabortion bill was passed during the state's 85th legislative session, and this will likely have further effects on individuals seeking abortion services in Texas. A qualitative analysis was performed in conjunction with archival research in order to gain insight into the perceived effects of abortion legislation for women navigating these changes. A thematic analysis of five in-depth interviews conducted with pro-choice experts revealed two major themes—trust and control—which were supported by findings in archival research. A common trajectory for the informants' consideration of abortion effects also became apparent during interviews, and this was analyzed in terms of the observed themes. Interviews began with negative perceptions of abortion legislation, followed by expressions of anger, and ultimately ended with professions of hope and resilience. Findings indicate that the overall impression of abortion legislation was negative, and this was tied to a considerable concern for the health of Texas' female population.

Introduction

I start to question if I made a wrong turn somewhere as I drive past the clinic again, looking for some obvious sign indicating I found the office. I check the GPS on my phone again and realize, to my chagrin, that the inconspicuous concrete building I just passed must be it. I quickly recognize the folly in assuming a large set of letters spelling “Whole Woman’s Health” would shine out from the building and illuminate the entrance to the only abortion providing facility in the Rio Grande Valley. It occurs to me that people walking into the clinic may not want their destination broadcast, and I note that the masses of protestors I have seen in videos apparently have no trouble finding it either.

As I park down the street and look back towards the clinic, I see the evidence I needed in the form of a massive, beautiful mural covering the side of the building. The clinic stands on the corner of an intersection, and the painting covers the entire length of the building’s north facing wall. Welcoming me as I walk down the street, the words “Dignity,” “Empowerment,” “Compassion,” and “Justice” stand out in large soft blue letters brightly contrasted against a background pattern of a deeper blue. The words, composed entirely of strong capital letters, each stand above one of the four brightly colored murals of women that dominate the building’s wall. The murals seem to tell a story moving from right to left. It begins with the look of fear apparent on the faces of the two women seen on the farthest right mural, moving to the image of a woman reaching out in support to the two who are frightened, and culminating in scenes of women in various poses offering each other comfort and strength. I think to myself that the message is as beautiful as the painting as I continue down the sidewalk.

I continue south past a crosswalk and finally get a proper view of the clinic entrance across the street in front of me. I survey the plain beige building and realize the large concrete structure—displaying the street address and completely obstructing the view to the clinic’s entrance—along with the muted concrete awning casting shade below prevented me from seeing the name on the building in large black letters. As I stand in the sweltering Texas summer heat, clinging to whatever shade I can find as I wait for the signal to cross the small stretch of street separating me from the clinic, I notice the two massive vinyl signs attached to the two story brick building next to the abortion facility. The first, positioned close to the building’s edge near Whole Women’s Health, shows the picture of a fetus in front of a black background next to the words “ABORTION STOPS A BEATING HEART” in large capital letters stacked on top of each other in three throws. A red line indicating a heartbeat flat lines abruptly at the beginning of the text and separates the second line from the third. “Abortion” stands out in a red font above the white words below, and juxtaposes sharply with the massive word

“heart” below. The second sign, mirroring the position of the first on the other half of the brick building, simply reads “PRAY TO END ABORTION” in white letters against a black background above a 40 Days for Life logo.

I imagine how difficult it must be for women struggling with the decision to seek an abortion to stare at those vinyl messages as they wait to cross the street. The shame these signs could induce seems apparent, and I wonder how often this tactic works. I wonder if the messages ever stop a person waiting at the crosswalk from making that final trek across the street to the clinic doors. As I stand waiting for my turn to cross, a large blue truck slows as it pulls up next to me before coming to a complete stop. Thinking the light turned, I check to see if I can cross, and realize that the driver still has a green light, and he simply just stopped driving. The man, in his mid-thirties with short dark hair, stares over in my direction as his car idles. Not sure what to do, I continue to wait, thinking maybe the man is simply lost like I was earlier. It becomes clear quickly though, that instead of searching for clues to get himself back on route, the man’s gaze focuses solely on me. I immediately feel uncomfortable, and begin nervously shifting my weight from foot to foot.

I think perhaps I am imagining things; surely the man will begin driving soon, or at least look away. His gaze never wavers though, and as he continues to stare, I begin to feel self-conscious and check to make sure no stains stand out on my white blouse. A car pulls up behind the truck, but the traffic behind him does nothing to deter his lingering scowl. I watch as the traffic light turns yellow, and he continues to watch me as the light turns red. Finally I get to cross, but my concern does not fade. The man stares at me as I cross in front of his car, and he turns his head to follow me with his eyes as I pass in front of his truck. Up close I can see the malevolence behind his gaze, and my suspicion that he is glaring at me in particular is confirmed.

Thoughts begin to swirl through my head as I cross the small road that seems to stretch on for an eternity. Is this the man’s response to assuming I am walking to the clinic? Am I simply overreacting? I tell myself that I am not doing anything wrong in an attempt to calm my nerves. I remind myself that I am in public and that nothing can happen to me in the middle of the day in front of the witnesses in the other car. I feel foolish and ashamed for assuming he is purposely trying to impose this feeling of discomfort on me, but the weight of his scowl is oppressive nonetheless. I wish at the time I had felt indignation for being leered at, but ultimately, and increasingly, I simply felt scared.

My experience simply walking up to the abortion clinic in the McAllen, a large city in Hidalgo County and home to the Rio Grande Valley's sole abortion providing facility, impressed on me how difficult it could be to take the step to visit a clinic. I was only there for research purposes, and the street was clear; I doubt I can imagine how distressing attempting to enter the clinic in front of a group of screaming protestors might be. Unfortunately, similar situations remain a reality for many people seeking abortion care at the Whole Woman's Health clinic. Throughout the Rio Grande Valley though, several other obstacles to abortion access exist as well.

Texas has implemented some of the nation's strictest abortion policies over the past few years, and these legislation changes have created barriers for individuals engaged in family planning strategies, especially those wishing to obtain an abortion. Legislation passed in 2011 severely reduced the funding for family planning institutions in the state, resulting in the closure of over half of its family planning centers, drastically limiting clinic access for Texas' population (Hankins et al. 2012). Further reducing abortion as an obtainable option for many, the 2013 legislation House Bill 2 instituted restrictions on abortion procedures, clinics, and physicians, ultimately leading to additional facility closures and abortion access obstacles (Baum et al. 2016). While portions of this legislation were overturned in 2016, many of the state's facilities remain closed, and accessibility limitations remain a reality for the state's population (Grossman, Baum, et al. 2014). Affordability, distance to clinics, access to transportation, and immigration status all create additional obstacles for individuals seeking abortion care. Texas' Rio Grande Valley has become an area of concern for abortion access, and it has been referred to as "a particularly vulnerable population" due to the multiple barriers compounding abortion access limitations (Grossman, Baum, et al. 2014, 497).

The Rio Grande Valley is composed of four counties found along the United States-Mexico border in the state's southern tip (Rio Internet Marketing 2017). Figures from the United States Census Bureau for the area's four counties—Cameron County, Hidalgo County, Starr County, and Willacy County—estimate a more than 30% poverty rate among the region's 1.9 million residents (United States Census Bureau 2017). Approximately 88-96% of the area's population identify as Hispanic, with 16-33% being foreign born residents (United States Census Bureau 2017). The Rio Grande Valley is also home to a large number of vulnerable undocumented individuals (Madeline 2015), who face additional barriers to abortion access due to the area's Border Patrol presence. During my stay in McAllen, the frequency of immigration enforcement vehicles—easily distinguished by the presence of a green stripe on the side—quickly grabbed my attention, and I tallied six patrol vehicles during the five minute drive from my hotel to the Whole Woman's Health clinic.

The combined factors which limit abortion access in the Rio Grande Valley may create an increased burden on those who wish to terminate a pregnancy as a part of their family planning strategy. In order to better understand the effects of abortion legislation changes for the individuals facing these barriers, I conducted qualitative research utilizing a thematic analysis of five interviews along with archival sources. The themes discovered provide insight into the perception of abortion legislation restrictions and highlighted some of the ways in which women are reacting to abortion policy changes.



Figure 1: Whole Woman's Health Clinic in McAllen, TX (Lowrey 2017b)



Figure 2: Antiabortion poster next to clinic (Lowrey 2017a)

Literature Review

Texas legislation pertaining to abortion is an ever-changing entity, one which has continued to evolve with the 85th Texas legislative session. Over 50 bills and amendments concerning abortion were proposed for the regular session (Texas Legislature 2017a), illustrating the importance of the issue for the Texas Legislature. Governor Greg Abbott signed Senate Bill 8—legislation requiring the burial or cremation of fetal tissue and banning a common abortion procedure referred to as dilation and evacuation—into law after the regular session came to a close, and the new abortion restrictions and regulations outlined in this law was scheduled to go into effect September 1, 2017 (Texas Legislature 2017b). The passing of SB8 highlights the current fluid nature of abortion policies in Texas, where previous legislation restricting abortion access—House Bill 2—was overturned by the United States Supreme Court in 2016 (Texas Department of State Health Services 2016). As Texas legislation concerning abortion continues to fluctuate, research pertaining to the subject is continuing to grow and develop as well.

Portions of the academic collection dealing with abortion regulation changes in Texas review the health considerations involved for the state's female population. For instance, analysis of maternal mortality rates indicates that the United States has an disproportionately high rate compared to other developed nations, and that the rate in Texas—among the highest in the nation—exhibits a trend of continued growth (MacDorman et al. 2016). Adding to this, the Texas Department of State Health Services' Maternal Mortality and Morbidity Taskforce reports a continued increase in the maternal mortality rate for Hispanic women (2017). Additional evidence suggests that the rate of unintended pregnancies for minorities and low-income individuals is significantly higher than that of other groups (Finer and Zolna 2016). Moreover, rates for unintended births is highest for Hispanic women than for any other ethnicity or race (Finer and Zolna 2014). These statistics represent health factors and concerns for the Rio Grande Valley, which incorporates a large percentage of both Hispanic and low-income communities (Center for Public Policy Priorities 2014). Compounding these concerns is census data which reveals Texas to be the state with the highest level of uninsured citizens (Smith and Medalia 2014). These studies give insight into the milieu in which women in the Rio Grande Valley find themselves embedded. In an area with a high risk for unintended pregnancies and maternal mortality rates, in addition to low insurance coverage to aid in the procurement of care, the studies also provide insight into the state's interests in abortion legislation and the health of its female population.

Other research pertaining to abortion considers the necessity, and possible ramifications, of legislation restricting access to abortion. Boonstra's study evaluating the occurrence of abortions obtained during times of antiabortion legislation reveals that hundreds of thousands of abortions continued to occur annually in the US despite the illegality of these procedures. Boonstra asserts that the United States' decision to ban abortions had a greater impact on the method utilized to procure the procedure than it did on the actual extent to which people sought to terminate a pregnancy; abortions continued to occur even after antiabortion legislation went into effect, and the procedures were both numerous and dangerous (2006). These findings are reflected in similar studies that have established an increased rate of do-it-yourself (DIY) abortions in Texas (Burnett 2016). Additional research supports the assertion that self-induced abortions do occur in Texas, and it further states that Latina women living in areas with easy access to the US-Mexico border—which provides an increased opportunity to obtain abortion-inducing drugs from pharmacies in Mexico—experience higher rates of these abortion incidences (Grossman et al. 2015). It is possible to infer from these studies that the addition of restrictive abortion legislation in Texas will likely impact the method used to terminate pregnancies in the Rio Grande Valley, rather than eliminating the procedures altogether. If this is true, additional health concerns exist for the women seeking illegal abortions, as evident in a study on the mental health for women in the United States, which reveals that the perceived rate of anxiety is higher among women who are forced to seek alternative abortion procedures than for those who have access to abortion care (Biggs, Neuhaus, and Foster 2015). Supporting this, a different study concludes that the risks associated with the birthing process resulting from an unwanted pregnancy pose a greater threat to the health of the mother than those associated with legal abortion procedures (Gerdts et al. 2016)

Recent findings from the Guttmacher Institute also call into question the effectiveness of policies meant to reduce the number of abortions being performed in the state. One study asserts that contraception is the most effective means for limiting unintentional births, and it points to this as explanation for the reduced abortion rates in Texas, pulling into question the effectiveness of the state's antiabortion legislation (Wind 2016). These results have meaningful implications for the Rio Grande Valley, where 2013 abortion legislation led to the closure of more than half of the family planning clinics with abortion providing facilities in the state (Fuentes et al. 2016). It is possible that the decreased availability of contraception resulting from clinic closures may result in an increase in the number of unplanned pregnancies, which could also lead to increase of women seeking abortions. In light of the research mentioned above, policies that limit access to abortions may pose an actual threat to the health of pregnant individuals in the Rio Grande Valley.

Methodology

This research utilized a qualitative approach focusing on thematic analysis in order to gain insight into the opinions of women navigating Texas' changing abortion legislation in four of its southern counties. The research design incorporated semi-structured interviews, online surveys, and archival research. Recruitment involved research of clinics and advocacy groups, followed by correspondence requests sent to the contact information present on websites. The requests were completed through either electronic or telephone communication channels, depending on the preferred contact method listed on the websites. A log of field notes from the visit to McAllen was also created, meticulously describing details of observations and conversations. The field notes later served as important reference materials during interviews and analyses.

Initial research centered on archival sources, including government documents, advocacy websites, and newspaper and magazine articles—both local and national. The analysis of archival evidence represents the context of the culture in which it was written and can therefore provide insight into the beliefs and opinions of a population (Brettell 2014). These resources also illustrate changes over time (Bernard 2006), making it possible to observe changes in cultural context over time through archival analysis. Archival research in the form of videos and images also provided access to accounts of expressed actions and opinions, allowing for a sort of participant observation from a distance. Three newspapers from the Rio Grande Valley were searched daily for articles referencing abortion from May 1, 2017 to July 10, 2017, resulting in 94 results. The search of *The Brownsville Herald* produced at least one new result per day, speaking to the importance of abortion legislation for the region's population. An additional 30 articles from national newspapers and advocacy sites concerning abortion legislation in Texas were collected for the years 2013-2017 in order to establish any changes in themes over the four year period. Archival research can also aid in the identification of possible areas of interest for interviews (Barker 2004), and the topics of DIY abortions and human

rights were considered when creating interview questions. All of the articles collected were submitted to thematic analysis, which was compared with the themes discovered in interviews.

Interview recruitment required purposive sampling (Bernard 2006) for informants who were knowledgeable about the effects of abortion legislation in the Rio Grande Valley. Due to the scale and timeframe available for research, categories for possible informants included individuals who have obtained an abortion, those working in abortion rights advocacy and legislation centers, and those working with abortion clinics. Five in-depth interviews were conducted—one with a woman who had obtained an abortion, three with women working in various abortion advocacy centers, and one with a woman in a leadership role within an abortion providing facility. Minimal snowball sampling occurred, and one informant's participation resulted from her connection to a previous interview participant.

Building a rapport and creating a relationship built on trust is essential to ensuring informants will be forthcoming and provide honest information (Bernard 2006). Trust often takes considerable time to build, and the loss of trust in an investigator can have devastating effects on research (Fontana and Frey 1994). As a general topic, termination of pregnancy is a sensitive one, and building a sense of trust is paramount to gaining access to individuals navigating the issues of abortion legislation. Most of the individuals who responded with interest in interview participation requested additional correspondence with me before agreeing to a formal interview session. These conversations often served as pre-interview interviews, where the potential informants sought assurance that no negative effects would result from their participation in the research.

One aspect of gaining the required trust necessary to obtain meaningful data includes the researcher's obligation to be honest and transparent. Nancy Scheper-Hughes' experience being exiled from the community she wrote about, whose people felt they had been unfairly represented in her analysis and accused her of profiting at their expense, depicts an example of the severe consequences that may result from informants feeling their trust has been betrayed by a researcher (Scheper-Hughes 2000). When my conversations with informants turned to questions about my intentions and my stance on abortion, I openly stated my pro-choice position. I initially struggled with the concept of participating in objective research while honestly sharing my personal beliefs, but I ultimately came to agree with Fluehr-Lobban that maintaining cultural relativism does not mean that advocacy for others should be suppressed (Fluehr-Lobban 1995).

Once trust was established, semi-structured interviews with open-ended questions were conducted. It is possible to discover broad themes representative of larger scale study results through thematic analysis of six interviews (Guest, Bunce, and Johnson 2006). The extensive experience and understanding of abortion legislation issues the five expert informants for this research represented allowed for an analysis that could reveal themes present in the ideologies of a larger cultural population (Bernard 2006). The interviews were analyzed using inductive coding (Miles and Huberman 1994) and then cross referenced for the presence of common topics, several of which appeared. In order

to add a potential statistical analysis to the research, surveys were also designed and given institutional review board approval with the intention of distributing recruitment flyers for survey participation in women's health clinics. Several clinics were contacted, but in an effort to protect patients, none were willing to distribute or post survey recruitment materials. A complete absence of survey participation removed any survey analysis from consideration in this research.

Results

Interviews tended to follow a common trajectory, with informants initially conveying concern about abortion legislation, followed by expressions of anger, and ultimately transitioning to professions of hope and resilience. Several shared topics of concern among interviews were present, and through second cycle coding (Miles and Huberman 1994), two overarching themes became apparent: trust and control. A similar pattern of discourse spanning from concern to hope was also observable in the archival research sources.

Trust:

Informants spoke of changes to abortion legislation in terms laced with negative connotations early in the interviews. Belinda, a volunteer and board member with a nonprofit activist collective that aids women in securing rides to abortion clinics, remembered the passing of HB2 as “completely devastating.” Belinda’s disapproval of abortion legislation in Texas was mirrored by the informants as well, and the terms “disgusting,” “disrespectful,” and “frustrating” continuously appeared throughout interviews. In this initial stage of the common trajectory, a broader theme concerning trust—or the lack thereof—appeared. The absence of trust in the state representatives pushing for abortion legislation reforms quickly became apparent in the interviews. Sophia, the state organizer for a youth-centered advocacy organization, began her interview by referring to recent abortion legislation bills as “medically unnecessary and ridiculous.” Her opinion reflected similar statements by other informants who felt that legislators did not have the best interest of the state’s citizens in mind. Belinda began her description of disillusionment with Texas legislators when speaking about activism, and she lamented that activists are “having all these protests and talking to politicians, but not having any of them listen to us. You know, it gets old.”

Informants also referred to the abortion legislation reforms as part of a political strategy void of considerations of the population’s health, and these statements often expressed concern and cynicism in the legislative process. As a senior employee of an abortion clinic, Gloria interacts with both patients and legislators, and she has pushed for abortion legislation reforms for years. During her interview, Gloria stated:

We very well understand their approach and their strategies. . . but what’s kind of mind blowing, and makes you feel disbelief, is how do they arrive at

those conclusions having information—very clear and easy to understand information—that tells you that by passing these regulations you are going to harm people? You're going to harm families, the very people you are in office to protect. You are going to harm them, and knowing that, how do you continue to push this agenda? It's just outrageous!

As Gloria's quote shows, this initial phase of interviews included Texas legislators being accused of failing in their role to represent the citizens they were elected to serve, and an inherent distrust clung to these accusations as informants questioned the politicians' true motives. Jennifer, an advocacy center director who works on combating antiabortion bills at the legislative level, summed up this notion saying, "Ultimately politicians want to play politics with women's health, and they think they will gain political points from a very small but vocal group of their constituents who want abortion to be illegal or inaccessible."

In order to support such claims, informants often followed incredulous statements with the proposal of a question of their own. Informants asked whom do the abortion restricting laws benefit, and followed the inquiry with various forms of evidence to answer the question and justify their distrust of political motivations. The implicit, and sometimes explicit, answer to the question always materialized—as Brandi put it—"not women." Brandi, a woman in her mid-twenties, had an abortion a few years ago and feels strongly that the reforms to abortion legislation are actually quite detrimental to women's health. After asserting that abortion reforms reduce access to healthcare necessary for the wellbeing of Texas' female population, she said "I really hope that legislators see that, by what they're choosing to do with this kind of 'buzzwordy' prochoice legislation, is that they're making their constituents ill."

Informants also utilized discussion of the dangers inherent in pregnancy and childbirth as initial support of their lack of trust in legislators. Facts about high maternal mortality rates, low healthcare coverage, and financial burdens filled the conversations as the women bolstered their arguments. Belinda explained that "We have the highest maternal mortality rate in the developed world, and so it's not like giving birth is a safe option here. And once you give birth there are no programs in place that help working parents. . . . [Y]ou have to be at 200% of the poverty line to receive WIC and food stamps and things like that. Texas is a terrible place to be pregnant." Archival sources reflected Belinda's sentiment, and an article in *The Texas Observer* condemned the state's legislators for neglecting to give reasonable consideration to the healthcare crisis facing Texas' women (Novack 2017). Jennifer expressed a similar concern as well:

Nationally, about 60% of women seeking abortion are already mothers; they already have children. . . . I can assume that's similar in Texas. I just think about the economic consequences of not being able to access an abortion. What we know is that all these changes make abortion much more expensive because you can't use any government funding for your abortion. . . . [T]hey're almost certainly going to pass a private insurance ban. . . . [Y]ou won't be able to use

private insurance to cover the cost. So then you have to have two appointments. . . . [Y]ou still have to take two days off of work, and you still have to find child care. And those economic consequences add up so quickly. . . . I just think that's so tangible. . . . [T]here's a huge economic burden as a result of the legislation that doesn't actually have any effect on the health of the woman or her decision.

Gloria's biggest concerns for the Rio Grande Valley revolved around the poverty levels present there. Talking about the average income, Gloria said, "What does it cost to have the procedure, and what are people able to afford? The majority of our patients, we help with funding, and if that wasn't something we could do, I don't know that many people would be able to get the services they need."

While the informants often noted that these factors seem compounded in the Rio Grande Valley, they also expressed concern for women throughout the state, pointing out that abortion restricting legislation affects women all over the state to some degree. Belinda mentioned a national concern complicating her consideration of abortion legislation in Texas, saying, "the national political climate, I feel, really emboldens Texas politicians to out-conservative each other, and its gets really scary." In a similar statement, Gloria explained that:

The Rio Grande Valley is my home, and I will always have that special connection, but it worries me not only for my community, but it worries me for everyone everywhere in the state. And the fact that that legislation doesn't stay in Texas, but is actually something you see happening all across the country, worries me a lot-- to see where the country is going when it comes to healthcare and especially when it comes to women's healthcare.

Gloria's statement, expressed while discussing the obstacles to abortion care in the Rio Grande Valley, represents the concern held by the informants for women throughout the country.

It was common for interviews to then turn towards evidence suggesting that banning abortion does not prevent the termination of pregnancies. Jennifer expounded on this by telling me what she considered to be a helpful perspective on abortion: "unintended pregnancy is the problem; abortion is one of the solutions. It's going to happen. Even if everyone in the state of Texas had access to birth control, we'd still need access to abortion because accidents happen. . . . [I]t's just something that needs to be available." Speaking of legislators and their motivations, Belinda made a similar comment and asserted in her interview that "they just want to stop abortion, but we know that's not going to happen. Even when they make it illegal, it's still going to happen. It's just going to be more dangerous."

Following discussions outlining the futility of antiabortion policies, the conversations inevitably turned to the risks associated with self-induced abortion and a concern for the health of women opting for one of these pregnancy termination methods. Jennifer explained how some people seek out Misoprostol, a drug often used in conjunction with the medication Mifepristone in clinics to induce abortion.

While the abortion clinic down here was closed, people were going to flea

markets where people were selling Misoprostol. People know they can bleed, but . . . people will take it not really researching it because there's basically no way to get information on how to self-induce abortion that is legal. There are some free based groups that do that type of information, but it's really hard to get in touch with them. . . . [P]eople don't have that info here. It's very hard to obtain, so there are a lot of medically unsafe self-induced abortions just because they don't have the full information about it.

Women on Waves is an example of one of the groups Jennifer mentioned, and they have a website set up to provide information on how to safely induce an abortion with Misoprostol—directions on the website are posted in 20 different languages reflecting the need for information across different cultures (Worrell 2017a). The website also provides a list of more than 150 websites that sell fake Misoprostol (Worrell 2017b), speaking to the risks inherent in seeking to induce an illegal termination of pregnancy. Self-induced abortions were viewed as an inevitable and dangerous result of restriction to legal abortion options. This concern was mirrored in archival sources as well, and one article described the dangerous and increased incidence of self-induced abortions, referring to Texas as a “hostile territory for abortion rights” (Burnett 2016).

Connecting the facts surrounding the dangers of restrictive abortion policies, the argument presented in interviews asserted that abortion legislation changes benefited those approving them instead of those they affect. Building on earlier statements that legislators do not consider the wellbeing of their constituents, informants suggested that the impetus for abortion-legislation reform efforts reflected legislators' concerns with self-serving bills. Simply put, the informants felt legislators care more about votes than the people they are meant to serve. Jennifer summed up this notion saying, “The legislators are supposed to work for us right? Don't worry about your votes; worry about us.” Belinda expressed her frustration concerning a lack of care for citizens saying, “the Texas legislature has made it really clear that the men who are there don't give a damn about people who can get pregnant. They have their own religious and sociopolitical ideologies, and they have no problem at all imposing them on everyone else.” Gloria viewed legislative actions as a way to garner support from certain voters at the expense of the greater population. She said, “I think it's a very clear and direct approach to this anti-choice political agenda that harms Texans in general . . . knowing that we have the precedent of *Roe v Wade*, and that it's not as simple as scratching off the law to make abortion illegal, they try to make [obtaining an abortion] as difficult and impractical as possible.”

The concern with political strategy represents the lack of trust informants felt for the legislative system where abortion legislation is concerned. Each of the interviews correlated the perceived political motivations with both the conservative Republican Party and religious groups. In her interview, Jennifer stated that “I see that a lot of this is happening in our country right now. . . . [F]ar-right politicians are making decisions based on what they think will get them political points and not what is actually based in science or evidence.” Brandi directly linked the Republican Party to abortion regulation, saying, “because antiabort[ition] legislation is typically a republican talking point and

something that . . . they use as a pro for them. . . . I feel that's where it began, and it kind of grew until the legislation essentially passed." Similar sentiments were presented in archival research as well, and as one newspaper explained, "If you've ever been to Texas, you know that Texans pride themselves on doing just about everything bigger. This dangerous obsession with size also extends to how far Republicans are willing to go to stop a woman's right to access abortions." (Macias 2017, par. 1)

Concerning religion, Gloria stated "Religion especially has a lot to do with it; I think mostly it's the ignorance of not understanding how people arrive at the decision of ending a pregnancy, for whatever reason it is." The ties made between legislation, religion, and political party affiliations represent an infiltration of abortion issues into the larger culture. Sophia spoke of how abortion complicates the issue of religion, and she stated that "I think people use it more as an excuse . . . like 'I'm Catholic, I have to be antiabortion,' but really they just don't want people to have the choice and access to abortion." In this context, religion also becomes a means of furthering political strategy. Archival sources also considered religion when discussing abortion. When describing a convention for the religious organization Focus on the Family where Vice President Mike Pence rallied around efforts to end abortion, an article in *The Brownsville Herald* stated that "Many older evangelicals have stayed the course, helping Trump become president and the religious right gain political power" (Associated Press 2017, par. 3). Through these ideas, interviews and archival sources convey religion as both an ideological system with a sincere opposition to abortion as well as a tool utilized in conjunction with the political system in order to further political agendas. The intersection of cultural and religious values concerning human rights can penetrate the judicial system (Burchardt 2013), and while much could be discussed about such interactions, the scope of this research allows for the consideration of the connections mentioned in interviews to a concern with broader issues. The connection to large-scale concerns is discussed further during the consideration of control as a thematic element.

The discussion of political strategy as a cause of distrust also broached the changing nature of the arguments presented in support of antiabortion legislation. Informants pointed to the recognition of an evolution in antiabortion rhetoric in Texas' latest legislative session as further evidence of political strategy based on agendas instead of a concern for the wellbeing of citizens. Jennifer explained, "For a long time with HB2 politicians were saying that this is all about women's health and safety. This legislative session they dropped that argument because the Supreme Court called them out and said that's not a valid argument. So now they're saying this is about the dignity of the fetus. That's their explanation for why they're passing legislation, and if you push them on that, they actually will come out and say 'I think abortion should be illegal.'" Belinda made a similar comment during her interview, saying "Politicians this year have even moved away from saying these abortion legislation bills are about women's health. They're being honest for the first time . . . that they just want to stop abortion."

Trust was also discussed in a different light, and interviews mentioned a lack of trust in women by state legislators based on certain aspects of current legislation. The interviews pointed to the wait period and counseling session required prior to abortion

care as evidence of a lack of trust in women to make educated decisions about abortion. When speaking of these abortion regulations, Jennifer said “I think they point to not trusting women and their decision making process. . . . [T]hat is just so insulting and assumes women have not thought about it, or are not capable of thinking about it.” Gloria asserted similar ideas about abortion legislation implications when she said, “The state has decided that you’re not capable to make the decision on your own without having some time to think about it. . . . The state thinks that you don’t have all that it takes to make a decision of what’s best for your life.”

Control:

Descriptions professing a lack of trust held by legislators for women always brought up the second thematic element—control—as evident in Sophia’s interpretation of abortion legislation. Sophia commented:

They think women need time to think . . . because they give you a buffer of a day to think about it once you get our consultation. So even just thinking that someone who’s seeking an abortion wouldn’t have thought about it extensively before is just so disgusting. . . . [O]bviously a person seeking an abortion would think about it before they go in there. They don’t need one day to think about it. It’s just to make people nervous and to get people not to get that abortion. . . . [T]hey’re like “Wow, we control all of this for you. We control you.”

Control as a thematic element dominated every interview and was incorporated into several aspects of the conversations. The preoccupation with abortion in Texas was presented in terms of direct and indirect measures of control over many facets of women’s lives. In a broad sense, women associated attempts to prevent abortions with attempts to minimize the rights and autonomy of women, and the legislative changes concerning abortion were viewed as stepping stones towards the goal of eventual illegal status for abortion. Belinda explained that:

Because of the lack of clinics, and because of the 24 hour waiting period and all these other restrictions, it means that a significant portion of people are not going to be able to access abortion in Texas. If they want to access abortion, they will have to leave the state, or they will have to stay pregnant. This is a very calculated move on the part of legislators to literally force people to continue a pregnancy they don’t want.

Sophia bitterly equated the newest set of abortion reform bills with control during her interview. In no uncertain terms she stated, “So all these things for the special session are just, they just want to control women because they feel they have the right to. And that’s just sickening and disgusting. . . . [I]t’s definitely just about getting control of women.” In her interview, Jennifer commented on the utilization of laws as a control measure saying, “Not only is it disrespectful, but it is trying to limit young women’s options for having a full life. Women cannot have full control over their life without full control over their reproductive life, their reproductive ability, and their reproductive health.” Brandi described restrictive legislation not only as limiting, but also as transformative in her statement that “It completely strips a woman’s value. She simply becomes a baby

maker—a machine to produce children.” One of Gloria’s statements stood out in that, through the acknowledgement of attempts to control women with restrictive legislation, she also espoused empowering views through her explanation of why these measures exist. Gloria stated:

There is no disguise. The intention is really clear . . . and a perfect example is anything that has to do with women’s reproductive healthcare. It’s incredibly regulated and prohibits access. . . . I do think there’s an element of fear of what empowered women can do and achieve if given equal resources. . . . I think there is some element of the fear of what could happen if we got access to the same resources as everybody else, of what we can achieve, and how that would change things.

Directly, removing the woman’s right to choose the termination of a pregnancy as a family planning strategy—or removing her access to a facility offering this strategy as a service—removes a degree of her autonomy. The informants argued that restricting abortion access restricts women’s ability to choose not only when to have a child, but also their ability to control their lives. As Jennifer succinctly repeated, “women can’t have full control over their lives unless they have full control over their reproduction.”

Informants agreed that while attempts to control women affected the entire female population of Texas, certain regions exist as particularly vulnerable targets. Women of color and areas with lower average income were presented as those most affected by legislation changes. Belinda asserted that “It’s poor people who are going to be affected the most. . . . It will inevitably affect the most vulnerable in our community . . . the homeless and queer and people of color and places like the valley are going to be hit even that much harder.” The Rio Grande Valley was seen as particularly susceptible to the ramifications of abortion policy changes due to additional barriers present for the population. Border Patrol stations were viewed as an extremely limiting force for abortion access, incorporating multiple forms of anxiety. Gloria talked about the limitations created by the checkpoints saying:

We’re talking about a border community, and so we’re talking about an international checkpoint and a Texas checkpoint . . . that also becomes an impediment. Not only for people that may not have the proper documents, but for people that are in the state working and studying with visas that have some kind of special perimeter that keeps them from leaving the community. And so the harm stretches.

My own experience with the checkpoint coming back from the Rio Grande Valley left me stunned after an officer asked if I was “sure” I was an American citizen while holding my driver’s license in his hand. My experience pales in comparison with Brandi’s retelling of the time her family was on vacation and had the entire contents of the car removed and searched, forcing them to repack their luggage once they had been cleared. “It was awful, and my mom [was] so humiliated. . . . I hate checkpoints; they’re the worst.”

Internal Border Patrol stations create an additional boundary to the difficult process of obtaining an abortion for women in the Rio Grande Valley. With the added

obstacle of having only a single abortion providing facility serving the entire region, the combination of the factors restricting convenient and affordable access can make obtaining an abortion a monumental task. A study on the effects of barriers to abortion access for women traveling to obtain an abortion—representative of the situation many women in the Rio Grande Valley face—revealed that “[t]he experience of multiple barriers appeared to have a compounding effect, resulting in negative consequences” (Jerman et al. 2017, 95). The informants asserted that the creation of an environment that magnifies barriers to abortion access is the current legislative goal. As Jennifer explained, “What it adds up to is just one barrier after another, and the idea here is that at some point along the way women or people seeking abortion are just going to give up.” Each policy restricting abortion access acts as a weight women in Texas must carry; as the weights multiply, they eventually become too heavy to carry, and the option of legal abortion becomes an impossible scenario. Sophia reflected this notion when she referred to the Rio Grande Valley. Considering the effect of the multiple limitations to abortion access in the area, she said, “Statistically, they would not be able to get an abortion probably. . . . [P]eople won’t be able to feel empowered to seek an abortion.” When this happens women lose a family planning option as well as the ability to choose that option for themselves, and in this way, they lose a bit of control over their own lives.

The interviews also presented several other ways in which abortion and control intersect. Informants reported that the control of information is one of the primary factors influencing an individual’s choice to seek an abortion. Interviews explained that two aspects of information are significant to abortion access: The withholding of information limits knowledge of available options, and the purposeful distribution of misinformation can prevent women from choosing abortion as an option. A common issue discussed with informants is the fact that many women simply do not know what their options are. This idea came up when Sophia described a common occurrence with her organization. “[I]t is awful . . . people didn’t even know abortion is legal in Texas as a whole. . . . There is so much that people just don’t know.” Gloria also spoke of the need for information when she discussed it as a means to help reduce self-induced abortions. She explained that “[w]e need people understanding that abortion services are legal and available and where they can get the access. I think there’s still a lot of confusion around that, and so people may be taking matters into their own hands not realizing there are places where they can go and get the help they need.”

The prevalence of misinformation also creates a problem for women considering an abortion. The informants explained that sometimes women believe abortion is not an option, not because they lack the information, but because they received false information. Gloria expanded on this saying, “We see a lot of people coming into our clinics with these notions or misinformation that were happy to clarify. We can provide the resources and information they need, but it is something we see quite often.” Others fear abortion is an unsafe option based on the information they have received. Jennifer lamented the fact that women seeking abortions are presented with such forms of misinformation in the required counseling sessions. She described the materials, calling them “inaccurate information which is designed to scare women. They are using

inaccurate information about a link to breast cancer.” Brandi also balked at the use of inaccurate information when she explained that legislators “use misinformation to prey on emotions.” When options are not presented as such, then a person does not have the ability to make an educated decision in their best interest, and they are instead relegated to the arena of options chosen by others and deemed appropriate for them to choose from.

Similar to how information can be used to discourage people from pursuing an abortion, informants explained that fear also plays an instrumental role in controlling abortion access. Jennifer explained that one of her organization’s goals is to reduce the fear interwoven with abortion stigma because “[w]e want to normalize the process. . . . [T]hey’re trying to make it scary . . . because it reinforces this shame and stigma.” As stated above, the use of misinformation to instill fear for one’s physical safety can deter individuals from choosing abortion, and this fear can also be utilized to promote antiabortion legislation described as protective measures. This is one reason antiabortion activists attempt to normalize stigma and shame as a direct response of abortion instead of a culturally created one (Kumar, Hessini, and Mitchell 2009). Sophia mirrored this during her explanation that antiabortion legislators take advantage of shame and promote the confluence of “abortion and all of the stigma. . . . They want people to feel ashamed of getting an abortion and this is just part of it. . . . This is just a way to make people feel bad.”

Stigma surrounds abortion and creates a powerful sense of shame, which can in turn lead to feelings of isolation (Astbury-Ward, Parry, and Carnwell 2012). Brandi expounded on this notion saying, “I think whenever you’re ashamed of anything, you don’t want to think about it critically, or ask about it, or talk about it. . . . You give up your autonomy to seek help or education because you’re too ashamed to admit that there is anything that needs to be discussed in the first place.” Interviews spoke of shame as a potent motivator often enveloped in fear for one’s spiritual health and reputation. When discussing the power of fear, Brandi explained that people are often shamed into thinking that choosing an abortion means “that there is something sinful in nature about you, that you are wrong, that you are bad and dirty. . . . You’re sinning to the point that you become a bad person. You become immoral.” This can have a powerful influence over individuals considering abortion, especially when considered in light of Sophia’s claim that stigma is amplified in small towns. She explained that “A lot of people know each other, and it’s hard to keep your business private.”

Protestors use shame when participating in pro-life activism, often carrying signs meant to invoke an emotional response. Informants explained that the protestor presence at the Rio Grande Valley’s single abortion clinic is particularly strong. Belinda stated that “Especially in the valley, they have such adamant protestors at the clinic. It, you know, it’s really a gauntlet for pregnant people to be able to access abortion in the Valley.” Gloria, who goes to clinics all over the state, said that “[i]n the Rio Grande Valley, they have the most aggressive picketing I’ve ever seen. . . . [T]hey try to trespass and they block people, violating laws. We regularly have to get the local police involved.” Sophia referred to the clinic’s protestors as “really nasty. . . . [S]ome of the things they say to

women is just unbelievably disgusting.” Due to the potent nature of abortion stigma, the rhetoric and strong presence of protestors at the region’s only abortion clinic could be viewed as an additional barrier to abortion access.

When discussing the various measures used to control women through abortion policies, informants often directed the interviews towards discussions about human rights. Sophia explained that antiabortion legislators use rhetoric to dehumanize women. She said “They want people to feel ashamed they had an abortion. They want to see a fetus not as a fetus but as a person. . . . I do believe it’s first and foremost a strategy, but I also think they don’t see women as people.” Jennifer decried abortion legislation as a violation of rights and said, “They have openly admitted they are trying to take away what is essentially a constitutional right for women.” She also stated that inherent in the goal to abolish abortion is the desire to “make women incubators.”

Reflecting Jennifer’s concern, in May pro-choice activists dressed in costumes similar to those in the novel *A Handmaid’s Tale* while protesting at the capital to point to a correlation between restrictive abortion legislation and control over women’s reproduction (Tuma 2017). Interviews proclaimed abortion access as a human right and discussed the implications of its removal in unequivocal terms. In her interview, Brandi said, “Shame and sexuality are used to control people in general but women in particular.” Gloria described her belief that because of abortion legislation, “[w]omen become less than citizens, where we deserve less than anybody else when it comes to the kind of care we can get. . . . That is an attack.”



Figure 3: Women in costumes protesting in Austin. (Birchum 2017)

The interviews seem to reflect Ginsburg and Rapport's assertion that patriarchal forces can reduce women to the realm of reproduction (Ginsburg and Rapport 1995). The thoughts expressed in interviews do relate to feminist theory—Sophia even rated the causes of abusive reproductive legislation as “patriarchy would be the top three reasons and then religion”—but the scope of this paper does not permit an in-depth analysis of feminism and abortion. However, it is important to note the tie between abortion, feminist theory, and broader concerns. Belinda held the strong belief that abortion legislation infused a larger cultural context, and she explained that:

Reproductive justice is not just about those actual, physical reproductive health things. It's also about being able to give birth and basically not die during childbirth. . . . It's about being able to have paid maternity leave and child care, and it's about organizations and companies and businesses who value parents. . . . Beyond those individual things, there's the bigger issue of being able to raise your family in a community that is safe . . . Where your elected officials look like you. . . . Where they actually represent who you are and your values. . . . Where you can breathe the air in your neighborhood and you can drink the water . . . and all these other things that go into how everything else in life intersects with reproduction.

Belinda's comment makes clear deeper consideration of abortion legislation on the lives of women. Sophia shared this sentiment and succinctly said, “Reproductive justice is all the issues.”

The discussion of antiabortion legislation as a human rights issue inevitably steered interviews toward a different consideration of control. Informants declared anger at the violation of the rights of women, which spurred women toward action to take back control of their lives and reproductive choices. Dissent among many citizens concerning changing abortion legislation in Texas after HB2 passed led to increased advocacy efforts in order to aid individuals unable to obtain abortion services on their own (Grossman, Baum, et al. 2014), and this was reflected in the interviews. Gloria described how conversations with patients brought her to advocacy. She said, “These are people I've had a connection with. We've had a deep conversation. To me that makes it personal. It's not ok—injustice.” Jennifer described advocacy as a collaborative call to aid those in need. She said, “Because of all of this there has been so many organizations that have popped up to help women get to these appointments and overcome these barriers. . . . That to me is such a positive, to see people on the ground, communities coming together to help strangers.”

The informants viewed advocacy as a means of regaining autonomy, but interviews also revealed other ways in which women in the Rio Grande Valley are exerting control over their family planning strategies. Belinda explained that one response to changing abortion legislation involved changing contraception options. She noted, “There was a huge surge of women after the election who opted for long-term birth control.” The utilization of self-induced pregnancy termination methods also functions as a form of autonomy expression. Gloria explained that this method had been used for years in the Rio Grande Valley due to a general lack of healthcare access. She reported that “[i]n the

border communities we've noted how people have tried to take medications or herbs or teas or other methods to self-induce." Gloria's statement mirrored evidence that border populations are more likely to engage in self-induced abortion activities (Grossman et al. 2015). While the decision to participate in self-induced termination methods does represent women choosing to end a pregnancy as a strategy for family planning, this is seen as far from an ideal means of control. Sophia explained, "People do it because they feel they have to, but it's dangerous and scary. They shouldn't have to think it's the best option."

Denying access to legal abortion methods does not eliminate the practice; "it simply makes unsafe abortion more common" (Grossman, White, et al. 2014, 74). That is one reason why advocacy efforts are so valuable, even when they prove difficult. Informants did not shy away from mentioning the struggles inherent in advocacy work, but instead admitted to instances of burnout. Gloria explained, "For the most part, what I get is disillusioned. I get just deeply sad to be honest with you. Very disillusioned, very saddened." Jennifer shared a similar sentiment and said, "Some days I'm not hopeful. . . . [W]e worked really hard this session to achieve our goal, and it was really hard when this legislation passed." These instances of fatigue were presented as fleeting, however, and invariably interviews ended with declarations of hope for the future. Gloria said that when disillusionment hits her, she looks at "the resilience movement, and I see standing back—not just standing down, and not backing down, to protect our rights. I see people coming together." Belinda stated that she felt "lucky there are so many organizations working together. It's a collaborative effort and not a competitive one . . . serving the community." As her interview ended, Brandi reassured me that "[w]e may lose some rights, but we are going to keep gaining support."

Conclusion

The interviews, much like the archival research, showed a continued trend of concern among Texans for the health and wellbeing of those citizens who may become pregnant. This concern is embedded in the notion that legislators promoting bills restricting abortion access are preoccupied with self-serving interests and attempting to further their careers at the expense of the state's female population. Antiabortion legislation is viewed as evidence that legislators feel women cannot be trusted to make the decision about which option is best suited to their family planning needs. These laws serve as a means to control the options women have, stripping them of their autonomy, and to allow for the control of women as well. In light of the alternative to accessible, legal abortion options, restrictive legislation is also seen as dangerous. However, acknowledging the legislative attempt to control women does not translate into feelings of powerlessness. Instead, women feel a drive to engage in advocacy efforts and community support, displaying their autonomy and fostering a sense of optimism.

While the themes discovered in interviews were also observed in archival sources, and though a common trajectory was observed in each of the interviews, it is important

to reference the scale of this research when considering application of thematic analysis to a larger cultural context. Several factors—including time, language, and physical distance—limited the scope of this research to individuals with openly pro-choice leanings. Many of the opinions stated by the informants in this research likely diverge from the opinions of other communities, and a great deal could be learned from a comparative analysis of pro-choice activists. However, it must also be noted that no single driving factor permeates opposing pro-choice and pro-life activism (Ginsburg 1998); it would be reductionist to discount the variation present within cultures as well.

In an issue strongly associated with the rights of women, it is important to remember that women stand as activists on both sides (Luker 1984). Though the viewpoints of the two groups appear diametrically opposed, whatever core beliefs are held, the activism displayed results from a genuine desire to create reforms that benefit women (Ginsburg 1998). Being a woman and a fellow Texan aided in my efforts to gain trust and access to informants, but my pro-choice stance created a bond and a shared understanding as well. During her work with communities in the Marshall Islands, Barker described her obligation as an applied anthropologist to work toward the interest of the populations her research represented (2004). Reading the stories outlining the devastating results of self-induced abortions gone wrong, I cannot help but to agree with Barker. For the Rio Grande Valley, where abortion access is extremely limited, advocacy plays an important role in the lives of women, and I feel anthropology can serve as another tool capable of helping maintain the health of Texas' citizens.

When I finally make it across the street to the concrete barrier, I stand behind it, hidden from the truck, and listen for it to drive past. A wave of gratitude washes over me for the protection of the wall that irked me only moments ago as it frustrated my attempts to find the building. My gratitude is quickly replaced by embarrassment as I admit that perhaps I did overreact to the staring man. Nothing happened, and I am ok, but I quickly realize I would not have done well if protestors had lined the streets that day. I get buzzed into the clinic and walk into the waiting room, greeted by calming music floating through the air and quotes of encouragement shining out at me from lavender walls. The worry that permeated my mind a moment ago dissipates as I am warmly greeted by the woman behind the counter, and I think to myself how grateful I am that safe places like this exist.

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Measuring the Effects of Culturing A549 Non-Small Lung Cancer Cells on Collagen, Engineered Basal Lamina, and Traditional 2D Cell Culture

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Abstract

One of the most vital components of oncological research is the environment cells are cultured in. 2D cultures have been used the longest, they are rather inexpensive and pose fewer ethical problems than animal or human testing, but they are not as accurate as modern 3D cultures. Our research investigates the dissimilarities between traditional 2D cell culture in a well plate and an engineered basal lamina (EBL) composed of collagen and extracellular matrix (ECM). Western blot was conducted to discern differences in proteins from A549 lung cancer cells cultured in polystyrene (2D culture) and the EBL. The proteins expressed suggest that the cells grown in the EBL further progressed into metastatic conditions. The proteins also suggested that cells grown in the 2D culture were not as healthy as those grown in the EBL. A 3-(4,5-dimethylthiazol-2-yl)-5-(3-carboxymethoxyphenyl)-2-(4-sulfophenyl)-2H-tetrazolium (MTS) assay was also used to test chemoresistance of the cells, using dimethyl sulfoxide (DMSO), temozolomide (TMZ) and doxorubicin (DOX) in 3 different concentrations for each. Cells in the EBL had higher viability in most of the conditions and therefore higher resistance to the drugs used. Further testing will help develop a better 3D culture.

Background

Most cancer research is done *in vitro*, outside a living organism, with nutrient providing media and drugs accompanying the cancer cells (normally referred to as 2D cell culture). However, while this is usually an inexpensive and more ethical way to test new treatments than using animal models, the results may be misleading. First, there is no resemblance to the human body in a cell culture dish. A drug may be effective inside a cell culture plate, but the results from that experiment do not predict its outcome once placed in the human body. It is of the utmost importance that the conditions in the petri dish best replicate those of the human body, especially when cytotoxicity of a drug is being tested. (1)

First, the differences between 2D cell culture and 3D cell culture should be evaluated in order to determine the different necessary fundamental elements needed in a cell culture dish. With around 220,000 new cases and 150,000 deaths in 2017 alone, non-small cell lung cancer (NSCLC) is one of the deadliest cancers for both genders, internationally. (2) In a 3D culture, A549 lung cancer, a specific form of NSCLC, is typically organized into a spheroid, unlike the monolayer seen in a 2D cell culture. (3) From basic cell physiology, it is known that cells do not simply grow in a single monolayer, but rather in relatively even ordered layers from a basement membrane. In the case of most cancers, individual cells experience dysplasia and hyperplasia, loss of uniform cell structure and excessive growth of cells. (4) A 3D cell culture not only will allow the cells to adopt a more innate morphology but also can create a more tumor friendly environment that allows more accurate results.

The design of an ideal 3D cell culture begins with creating a surface the cells are comfortable to grow on. In the case of A549 lung cancer cells, which are epithelial, a basal lamina (BL), the basement membrane mentioned earlier, would be appropriate. (5) The BL is responsible for maintaining cell structure and order, managing heterogeneous tissue interactions when the embryo develops in the womb, and attaching these different endothelial and epithelial cells to connective tissue. (6), (7) Many diseases arise when the BL is dysfunctional, and more specifically, when it is breached by cancerous cells, metastasis occurs. When the tumor cells become malignant and start to migrate from their original location, it is at that point when the cancer becomes harder to treat. (8) By using an engineered basal lamina (EBL) in this experiment, the relationship between A549 lung cancer cells and the *in vitro* BL can be studied further. Although the cells won't be tested for metastasizing rates, the proteins expressed along with cell viability can be quantified to allow the comparison of the differences.

Even with the BL providing nutrients and mechanical stability, adenoma cells are not self-sufficient. They require assistance from other healthy cells to thrive in what is a harsh, hypoxic environment. Stroma cells are responsible for the maintenance of normal, healthy cells, but despite the presence of tumor suppressing genes, they can be "recruited" by malignant, cancerous cells to structurally repair these cells and promote metastasis. In A549 lung cancer cells, stroma derived fibroblasts appear to be the most

abundant type of repair cell. (9) Over 40 genes expressed by these carcinoma-associated fibroblasts (CAFs) promote tumorigenesis by increasing matrix protein disposition, angiogenesis and infiltration of immune cells. (10) This would better explain the phenomena of cancer cells becoming insensitive to future chemotherapy treatment and healthy fibroblasts becoming mutated into CAFs. Further, with less competition from other cancerous cells, there are more nutrients and space for the surviving cells to propagate and potentially metastasize.

Because the A549 have one of the components found in the human body, the EBL, certain drugs must be selected to test how well these components, BL and CAFs, assist the A549 cells in regeneration and further proliferation. While dimethyl sulfoxide (DMSO) is often used as a control drug in these experiments, it is not likely to be used alone in actual cancer treatment; rather it is mixed with another drug and then administered. The reason being, it encourages the activation of tumor suppressing genes through activating proteins, such as HLJ1 and Activator Protein-1 in A549 lung cancer cells. (11) DMSO is considered a control because at 1% concentration, it becomes cytotoxic to the cells, which allows it to be easily compared to other chemotherapy treatments. (12) Although DMSO is not currently used alone in cancer treatment, if significant changes to the CAFs are noticed, more studies can be done to examine the effectiveness of the drug by itself.

A more pragmatic drug that has been used to treat other lung disorders, such as cystic fibrosis and tuberculosis, is temozolomide (TMZ). TMZ has been produced to be taken as an inhalant, providing a more direct application to the tumor and minimizing damage to non-cancerous cells. (13) TMZ's effect on the A549 cells is to create bulky methyl adducts, causing interruptions in the cell cycle and eventually causing the cell to undergo apoptosis. (14) However, just like treating everyday bacterial strains, over time the cancerous cells will build up a resistance, either by physically altering their membranes or producing proteins that render the drug ineffective. (15)

Doxorubicin (DOX) is one of the most common chemotherapeutic drugs used in treating patients with cancer. (16) The reason it is a commonly used drug is because of its effectiveness, promoting most of the A549 cells into Growth 2 and Mitosis phases. In these steps of the cell cycle, the cells are more vulnerable to cellular arrest that leads to apoptosis. (17) Because DOX is one of the more commonly used drugs, it needs to be administered with the assistance of nanoparticles, as the cells themselves have built up a resistance to the drugs penetration, their membranes impervious to the drug alone. (18) In our lab, affixing DOX to gold nanoparticles not only allows the drug to bind more effectively to receptors on the cancerous cell membrane, but also allows clearer imaging of the tumors.

Quantification of results is the most important step in doing research, otherwise communicating the significance of the findings can be difficult. One technique that will allow us to support that there is a significant difference between traditional 2D and 3D cell culture is Western blot. This technique separates proteins obtained from the cells by molecular weight and type using specific antibodies that act as markers. (19) Certain proteins indicate significant changes in the cells, for example in A549 cells,

overexpression of OCT-4 has a strong association with cell proliferation while NANOG can determine how prone the cells are to becoming malignant. (20), (21) Due to limited time constraints and not having specific antibodies, the Western blot analysis will also be limited in its results.

Materials and Methods

Preliminary results were obtained upon fabrication of the EBL in this experiment, and changes to procedure were placed into effect as well. These cells were MDA-MD-231 breast cancer cells, but the methods they were treated with will be similar to those performed with the A549 lung cancer cells.

Materials

All chemicals were purchased from Corning Incorporated, Sigma-Aldrich and Fischer Bioreagents and were not modified: Collagen Type 1, ECM mixture, 12- and 96-well plates, RIPA lysis buffer, protease inhibitor, Tris buffer, Glycine, Methanol, centrifuge tubes, DMSO, TMZ, DOX. The A549 lung cancer cells were provided by Dr. Kytai Nguyen's laboratory at the University of Texas at Arlington.

Fabrication of the Engineered Basal Lamina Equivalent (EBL)

The EBL fabrication process can be summarized (Fig. 1). The original procedure involved creating the EBL outside the well plate as an air-dried film, cutting it out into the desired shape and then inserting it into the individual wells. From the preliminary experiment, it was determined that the best course of action was to create the EBL inside the wells themselves as a crosslinked gel, as they were initially too flimsy in transfer. A mixture of ECM gel and collagen Type 1 in a 1:50 ratio were the materials used in the EBL, in this case 1 mL of collagen to 20 μ L of ECM gel. Once mixed, 600 μ L of EBL mixture were placed in each well for a 12-well plate and 40 μ L of EBL mixture were used for a 96-well plate. Each was tilted to ensure even coverage.

The EBLs were then allowed to air dry in a biosafety cabinet overnight. The following day, the gels were taken out of the biosafety cabinet and left under a UV lamp for 30 minutes to cross link the gels, so that the collagen would not deteriorate as fast when the cells and media were added.

Cell Culture

Before the cells were seeded, the EBL gels had to be rinsed with phosphate buffered saline (PBS) in order to de-acidify the environment. For each well of the 12-well plate, 20,000 cells were seeded into each well and 200 μ L of Roswell Park Memorial Institute (RPMI), the media that they would grow in, was added. The surfaces themselves (Fig.

2A-C), as well as the cells' growth over the course of 3 days (Figs. 2D-L) were imaged using a Leica microscope and its respective software. The 20x objective lens was used in each image. For our 96-well plates, the same PBS rinsing was done. 10,000 cells were added to the EBL gels and 5,000 cells were added to the 2D cell culture. Figure 3 displays the layout of the well plates. A Leica microscope was used to image their growth and an MTS assay was done 2 days after the drugs were introduced.

Western Blot

Sodium dodecyl sulfate polyacrylamide gel electrophoresis (SDS-Page) gels used were pre-made by Tamara Hill to save time. First the proteins were extracted from the cells by placing a lysis buffer cocktail in the wells, combining the RIPA lysis buffer and the protease inhibitor so that the proteins were preserved. The proteins are temperature sensitive, so a temperature of 4°C was maintained during this process to avoid protein degradation. Once the lysis buffer was placed in the well, it was incubated at 4°C, stirring occasionally. To get a high concentration of proteins, 4 Millipore centrifugal protein concentration tubes were used. For each condition, EBL, Collagen and 2D cell culture were each placed into its own tube, while the last tube was used to balance. Placing them in a 4°C centrifuge, they were spun at 13,000 rpm for 13 minutes. The proteins were concentrated in the centrifuge tube insert, while excess buffer was filtered through to the outer tube.

Once the protein samples were prepared, the concentration of protein needed to be determined in order to ensure an equal loading concentration of each sample into the SDS-Page gel. This was done by running a biochemical assay for proteins, and then using a spectrophotometer to measure absorbance at 490 nm. Absorbance varies with concentration, so by comparing the different levels of absorbance, we could find a way to dilute the two highest concentrations to match the lowest. The proteins were then diluted with RIPA buffer.

Now that each condition's concentration of protein was equal to the others, they were prepared to be loaded into the previously made gels. This means the proteins to needed be denatured by being placed into a warm water bath with 4X Laemmli Sample Buffer for 10 minutes. The gels then run under gel electrophoresis, which separates the individual proteins collected by molecular weight. For 90 minutes, 90 volts ran through the gel, and after that, the voltage increased to 110 volts for an additional 15 minutes. The gels were then transferred to a membrane overnight to prepare for blocking and antibody attachment.

Once the proteins have transferred to the membrane from the gel, the membrane must be blocked in order to create the clearest signal. The blocking solution was created from a 5% dry milk mixture: 1g dry milk to 2 mL TBST (tris-buffered saline tween 20). The membrane was placed in a container, covered with blocking solution and incubated for 1 hour in 4°C, then rinsed with TBST. Once the membrane has been blocked, the primary antibody must be incubated. Following the instructions that came with the antibody, the appropriate amount of TBST was used for dilution, followed by incubation at 4°C overnight.

The following day, the primary antibody was washed with TBST, and then the membranes were incubated with secondary antibody for 1 hour. This enables imaging in the x-ray developer. The proteins tested were Vimentin, Met, Epidermal Growth Factor Receptor (EGFR), and E-Cadherin. Rabbit-derived secondary antibody was used for EGFR and E-Cadherin, while mouse-secondary antibody was used for Vimentin and Met. After an hour of incubation on an agitator, the membranes were brought to the x-ray developer. Here, stable peroxide and luminol/enhancer solution were mixed in a 1:1 ratio, in this case 1 mL each, and poured onto the membranes. After 5 minutes, the membranes were transferred to a plastic membrane protector and exposed to 5" x 7" IBF x-ray film at varying times, from 5 to 30 seconds. Afterwards, the film was run through the x-ray developer and then scanned so that ImageJ analysis of the resulting protein bands from the samples could be performed.

Drug Delivery

For each drug, excluding DMSO, 3 different concentrations were created by Dr. Kim. For TMZ, 100 μ L, 500 μ L and 1000 μ L were the chosen concentrations, and for DOX the concentrations were 10 μ L, 25 μ L and 50 μ L (Fig. 3). After the seeded cells were given the chance to proliferate for 24 hours, the drugs were placed in their respective wells and incubated for 48 hours.

MTS Assay

After the cells were incubated for 48 hours in their respective conditions, they were tested to check their viability. The media was drained, and the working solution for the assay was added. The solution was 1 part MTS solution to 4 parts of the RPMI media that the cells were cultivated with. The solution was added to each well along with a column of empty wells to act as a reference. The MTS solution along with the cells were incubated at 37°C for 2 hours.

Once they finished incubating, they were brought to the spectrophotometer to analyze their absorbance rates at 490 nm. After that, the cells were bleached and disposed of into a biohazard receptacle.

Results

Data was collected and analyzed for both Western blot and the MTS assay.

Western Blot

ImageJ software was used to determine the concentration of each band for the 3 different conditions. The concentrations were measured 5 times for each band and averaged. Since the software requires manual tracing of the concentrations, averaging the values should minimize human error. They were then graphed for a clearer visual and easier comparison. (Fig. 4A-D)

Drug Viability and MTS Assay

Once the wells were scanned by the spectrophotometer, their absorbances were placed into an Excel sheet. To create the bar graph, the absorbance for the references were averaged as well as each drug trial and the averages were subtracted:

$$\text{Final Absorbance} = \text{Condition Average} - \text{Reference Average}$$

This was done, as the references had no cells present and acted as a base value. Subtracting it from each condition removes most noise from the MTS solution and allows the final absorbance to be measured. However, absorbance is not the best way to quantify the amount of cell viability, so it must be converted into a percentage:

$$\% \text{ Cell Viability} = \frac{\text{Absorbance of Condition}}{\text{Absorbance of DMSO}}$$

Since DMSO is our control drug and stops further proliferation, each trial must be compared with its results. The percentages were then graphed for easier representation and comparison (Fig. 5).

Discussion

For the Western blot results, the upregulation of the protein demonstrates specific characteristics the cells possess. The first protein measured, Vimentin, is responsible for structure of the cell membrane, stability of the cytoplasm, and maintaining cell signaling and movement. (22) In the context of cancerous cells, the upregulation of this protein signifies metastasis and an overall increase in cell survivability. (23) For these reasons, Vimentin is usually tested for first; it will always have a strong signal in cancer studies. A t-test was performed in Excel for each protein. The null hypothesis, that there was no significant difference, was rejected for each comparison: 2D cell culture (CC) and collagen only (CO), CC and EBL, and CO and EBL. The *p*-value was 0.05, and the values of each condition were 7.62×10^{-7} , 7.55×10^{-4} and 1.31×10^{-5} , respectively. The CC and EBL cells had the higher signals than those in the CO condition (Fig. 4A). It can be postulated that the cells felt more acclimated to these conditions, as seen with the images tracking their growth (Fig. 2D-L).

The next protein, Met, is similar to Vimentin. It plays a role in survival of the cell and metastasis; in the lungs, it is also responsible for reducing scarring of the tissue. (24) Overexpression also is associated with several human cancers. According to the t-test performed, the null hypothesis was rejected for each condition; there was a significant difference, with the values for CC/CO, CC/EBL, and CO/EBL being 1.82×10^{-4} , 5.68×10^{-5} , and 2.56×10^{-4} , respectively. The EBL had the highest value of all 3 conditions.

This would entail that the cells thrived well in this condition, as expression of the protein signals that key oncological pathways are activated.

E-Cadherin, a tumor suppressing gene, decreases the likelihood of cancer proliferation and metastasis. (25) Expression would imply that the cancer is progressing in its growth and further on the path to metastasizing. The null hypothesis was rejected for each comparison as well (6.67×10^{-4} , 1.28×10^{-4} , and 8.89×10^{-5} for CC/CO, CC/EBL and CO/EBL, respectively). The EBL had the highest expression for E-Cadherin (Fig. 4C). Considering the cell progression shown in Figure 2, it appears that the cells have more divisions, an indicator of growth, for the EBL.

EGFR was the last drug tested in Western blot. As the name implies, this protein initiates cell growth, and more notably, mutations are associated with lung cancer. (26) The null hypothesis was also rejected for each comparison, the values being 7.62×10^{-4} , 1.63×10^{-6} and 2.05×10^{-3} for CC/CO, CC/EBL and CO/EBL, respectively. There is a significant difference and EBL has the highest value of expression (Fig. 4D). Therefore, this would suggest that the cells are more likely to grow in the EBL than CO or CC.

After looking at protein expression, the MTS assay can indicate which conditions boost the cells' chemoresistance to the drugs used. Cells are living organisms, and when placed under stressful conditions, their health can quickly deteriorate. If they are in a more relaxed environment, then their chemoresistance should be higher. Besides the creation of a bar graph displaying percentage cell viability compared with DMSO (Fig. 5), *t*-tests were performed within each condition, to see if there was a significant difference between the EBL and CC as well as between each drug and DMSO, the control.

Assessing the differences between EBL viability and CC viability (Fig. 6A), the only conditions to have a significant difference, *p*-values less than 0.05, were DMSO, TMZ D1, TMZ D2, and DOX D3. This can be interpreted to mean that the survivability of the cells for these dosages depended on what surface they were cultured on. Another explanation for this can be that at low dosages (100 μ M, and 500 μ M), TMZ had distinct results, while DOX had such results only at its highest concentration (50 μ M).

Comparing the different drug dosages with DMSO for the EBL, only DOX D3 was significantly different. This could tie in with the previous proposition that because the concentration of DOX was relatively high, it was more effective at killing the cells in the EBL. For the CC conditions, TMZ D2, TMZ D3, DOX D1, DOX D2 and DOX D3 all had significant differences in the cell viability. This further suggests that the cells are stressed in the CC and are more susceptible to the drugs.

There are, however discrepancies between the *t*-tests (Figs. 6A-C) and the percent viability chart (Fig. 5). Some of the conditions don't appear significantly different when, in fact, they are, and vice versa. The explanation for this may be that the data for the chart was normalized, every condition was divided by the average absorbance for DMSO, so that the percentages could be directly compared. According to my mentor, while the *t*-test is important for numerical support, the percent viability can provide a bigger picture of how the cells interacted with their environment.

For example, DOX D2 and DOX D3 appear to have no difference between the EBL and CC conditions. This is because at the concentrations those cells were in, 20 and 50 μM , the drug becomes non-discriminating. The concentration is so high that it will kill most cells, and is mostly used to obtain a range that will work for a specific condition. The same can be said for TMZ D1 (μM). The dosage was so low that even the EBL cells were allowed to proliferate further, despite the drug being present. This narrows down what concentrations to use for future experiments with this EBL, along with what results to expect after the MTS assay is performed.

To conclude, there were several significant differences between the 2D cell culture and EBL. The expression of proteins that signify abundant cell proliferation and progression into a metastatic nature along with a higher chemoresistance for several dosages of drugs, the EBL appears to be a good starting point in improving *in-vivo* experimentation. Adding more components to the lamina itself or changing external features, such as submerging the cells in between two layers, may improve the results further.

Acknowledgements

I would like to thank Tamara Hill for being another mentor during this research process. Dr. Kim was out of town for a month, and she volunteered to teach me the techniques for Western blot and the MTS assay.

Figures

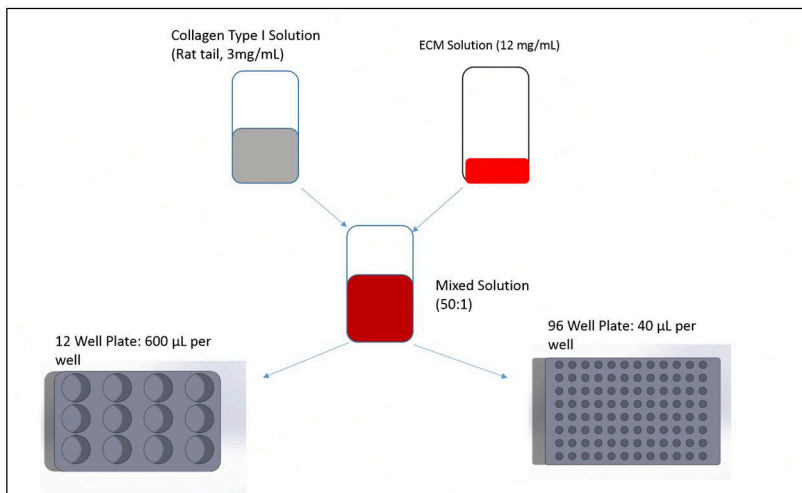


Figure 1. Fabrication of Engineered Basal Lamina Equivalent (EBL)

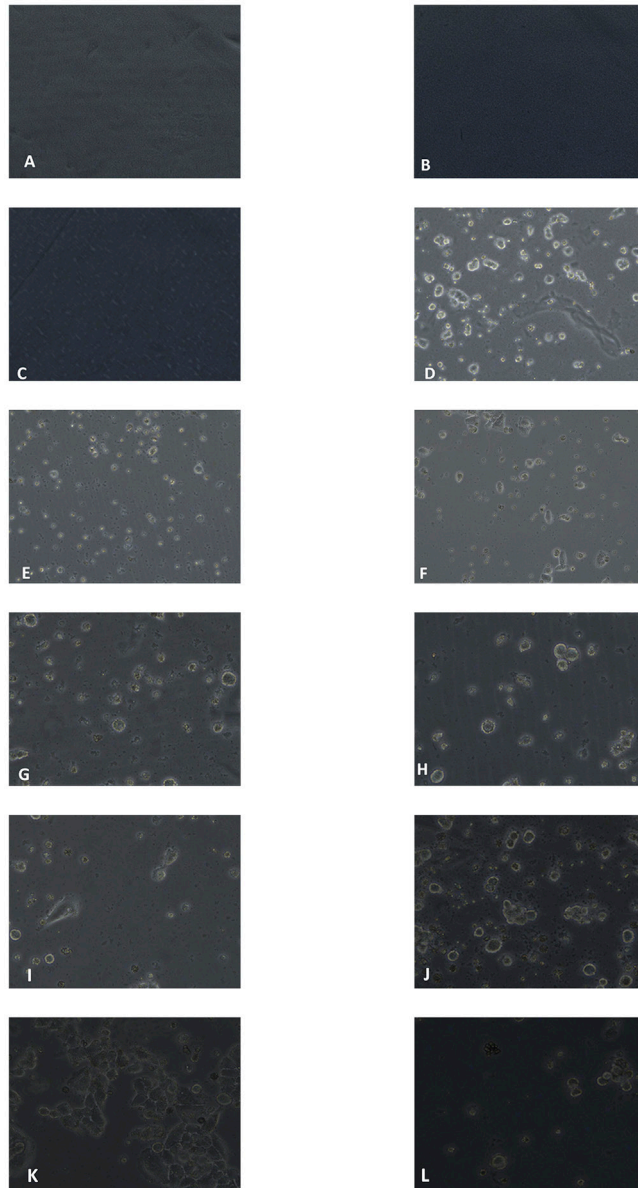


Figure 2. Images of the surfaces on which the cells were seeded, along with the cell growth for each surface. [A] Engineered Basal lamina (EBL), [B] Collagen only (CO), [C] 2D Cell Culture (CC), [D] EBL Day 1, [E] CO Day 1, [F] CC Day 1, [G] EBL Day 2, [H] CO Day 2, [I] CC Day 2, [J] EBL Day 3, [K] CO Day 3, [L] CC Day 3.

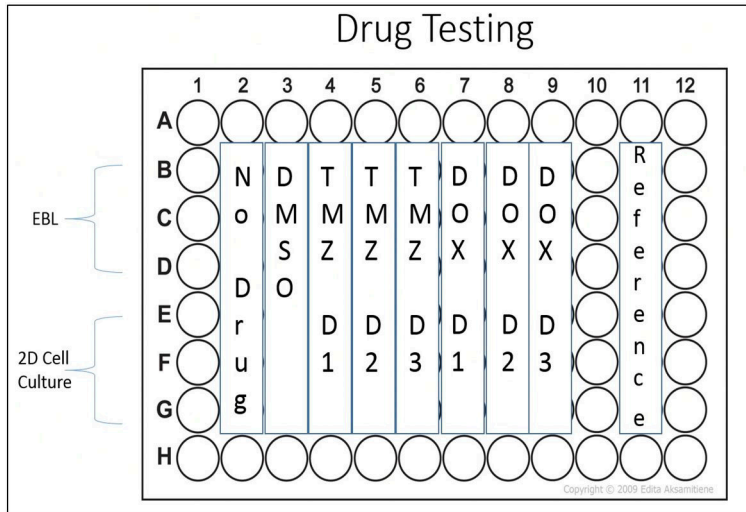
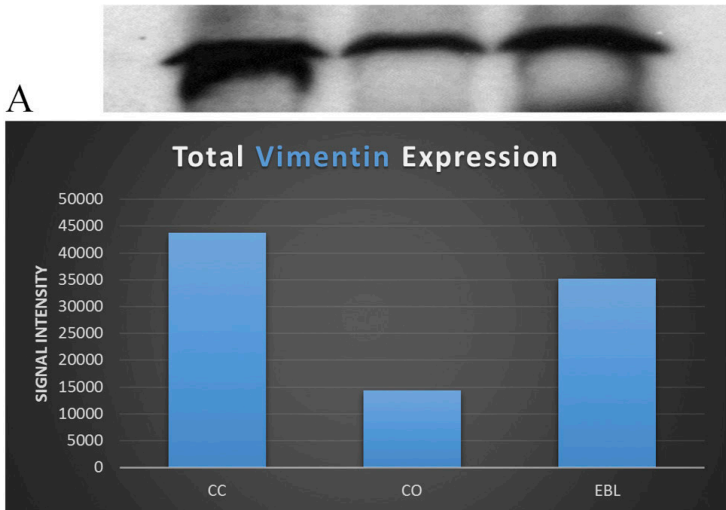
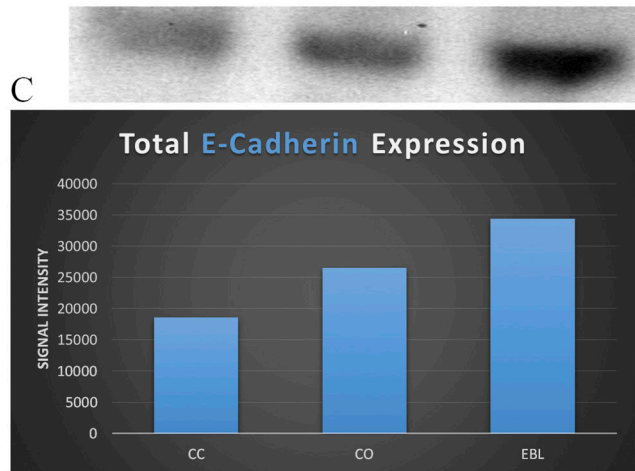
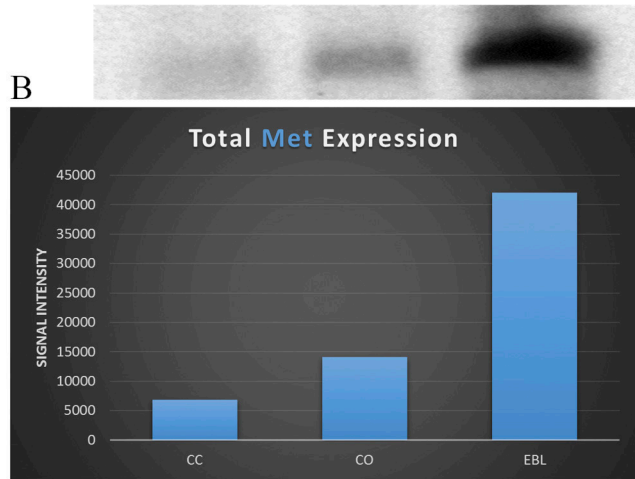


Figure 3. Diagram of the drug culture plate (96-well), each condition labeled. D1, D2, D3 represent the dosages in increasing order for each drug.





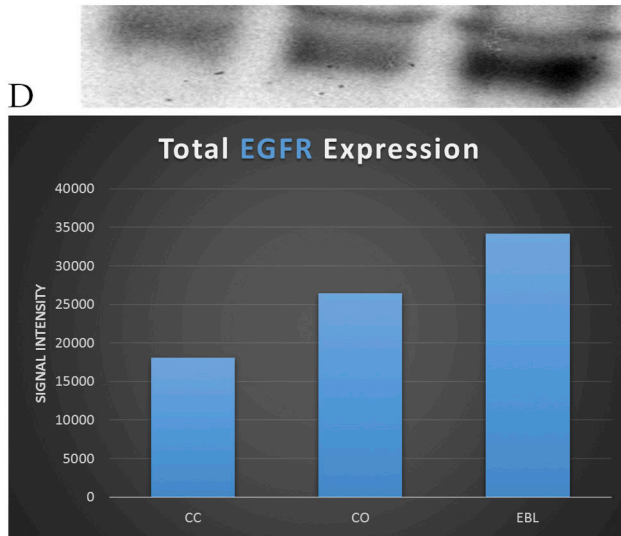


Figure 4. Quantification of Western blot bands, significant difference with a p -value of 0.05 for [A] Vimentin, [B] Met, [C] E-Cadherin, and [D] Epidermal Growth Factor Receptor (EGFR) between two samples.

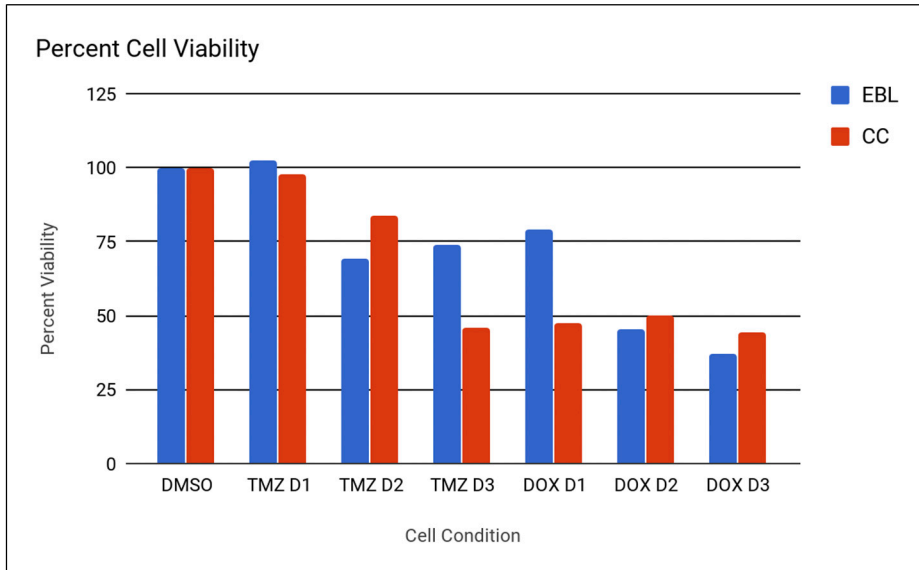


Figure 5. Bar graph of the percentages of cell viability per each condition compared with DMSO. Significant difference was tested with a p -value of 0.05.

A.

t-test for EBL v. CC	
Condition	p-value
DMSO	0.002706605
TMZ D1	0.022210207
TMZ D2	0.000442631
TMZ D3	0.879156381
DOX D1	0.863540592
DOX D2	0.093899494
DOX D3	0.010996962

B.

t-test for Drug v. DMSO (EBL)	
Condition	p-value
TMZ D1	0.917128402
TMZ D2	0.053770149
TMZ D3	0.560706954
DOX D1	0.485736839
DOX D2	0.053466115
DOX D3	0.004150997

C.

t-test for Drug v. DMSO (CC)	
Condition	p-value
TMZ D1	0.60125271
TMZ D2	0.021826242
TMZ D3	0.00155099
DOX D1	0.000288574
DOX D2	0.001237116
DOX D3	0.000628076

Figure 6. t-tests performed after MTS analysis for cell viability. All p-values compared to 0.05 for significant difference. [A] Distinction between the engineered basal lamina (EBL) and 2D cell culture (CC) for each condition. [B] Distinction between dimethyl sulfoxide (DMSO) and each dosage for EBL. [C] Distinction between DMSO and each dosage for CC.

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Abstracts

Effect of Photoperiod on the Sexual Reproduction of Freshwater Microcrustacean *Daphnia*

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Daphnia are cyclic parthenogens, so they reproduce asexually under favorable environmental conditions and sexually prior to harsh conditions. We used CP *D. pulicaria*, CP *D. pulex*, and OP *D. pulex* to test which photoperiod triggers sexual reproduction most efficiently and if there is any variation of photoperiod response with respect to their original geographic location. Two replicates of each clone were acclimatized at 18°C and 12-hour photoperiods. After establishment of third generation in acclimation incubator, replicates were distributed equally to two experimental incubators (10-hour and 17-hour photoperiod, 18°C). Then number of ephippia and asexual offspring produced were recorded for 15 days following day of sexual maturation. CP *D. pulex* reproduced sexually more in 17-hour photoperiod while *D. pulicaria* and OP *D. pulex* reproduced sexually more in 10-hour photoperiod. Slight variation in photoperiod response was observed within a species from different locations. Statistical test showed most of our data to be insignificant but we believe it was due to small sample size and presence of outliers. Even though our data do not show significant differences in reproduction mode of *Daphnia* at different photoperiods, our results can provide better understanding about effect of photoperiod on sexual reproduction of *Daphnia* for future studies.

Beethoven's Third Piano Concerto: What Can the Musician Do to Enhance Music Instead of Just Playing the Notes?

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The purpose of this research is to better the performances and musical understanding of young musicians. Young musicians too often play music unemotionally, robotically, and carelessly. As an approach to remedy this, I analyzed several sonata-form works by Mozart, Beethoven, and Haydn. Then, I pinpointed anomalous moments in subordinate themes and used Edward Klorman's approach to apply a musical narrative to the following "theme types": the sentence, the period, the hybrid three, and the compound period. Using William Caplin's analytical method, I provided stock examples of each type and then alternatively supplied examples with cadential deviations, expansions, deceptive "trick" endings, abandoned/evaded cadences, along with other atypical moments within the music. These anomalies play a part of the narrative, suggesting disagreements between different instruments or perhaps questions that may be left unanswered. By interpreting social interplay within music, young musicians will be able to create a more meaningful performance. Students will have an edge in applying for graduate schools and future careers in either music theory, pedagogy, music performance, or a combination of these. Additionally, it will give people a better understanding of music by thinking more in depth, having a higher sense of musical maturity, and applying a new conversational approach to the notes on the page.

A Study of the Iconography of the Mistress/Master of the Animals in the Near East and Aegean

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The image of a figure holding two wild animals, often called the “Mistress/Master of Animals,” has appeared across many periods and regions. Similar imagery has been found on artifacts from ca. 1400 BCE, where it is associated with a Canaanite goddess, on Aegean seals as early as 2160 BCE, on seals from Harappa in the Indus River Valley dating to ca. 2600-2334 BCE, and even on seals that are among the earliest from proto-literate Mesopotamia in the Near East, dating from ca. 5000 to 4000 BCE.

Far from being a randomly occurring icon, this motif has a demonstrable history closely tied to cultural concepts of divinity and royalty. Rather than a linear progression of transference and consistent meaning across all cultural boundaries, the Master/Mistress motif actually demonstrates an interconnected web of diffusion and cultural adoption. The symbol was reinterpreted to suit the needs of the elites of the population, and provide legitimacy to their position. Though often thought of two separate motifs, the “Master” and “Mistress” are actually manifestations of cultural interpretations of the same motif. This diffusion demonstrates the close relations these early cultures had to one another in spite of their perceived distinctness.

Health Habits of Nurses and Nursing College Students

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Hospitals promote healthy lifestyles, but little is known about nurses' diet and physical activity. It is important for nurses to serve as role models by living healthy lifestyles. Nurses can also improve existing hospital-based wellness programs and help create desirable services for nurses in the workplace. The purpose of this study is to describe health habits of nurses and nursing students in a large public state university. The study methods included a descriptive cross-sectional design involving 562 nurses and nursing college students at the University of Texas at Arlington who worked a range of shifts. The participants completed a survey questionnaire on health habits such as physical activity, nutrition, rest, and quality of life. The research study results revealed that over 50% of nurses and nursing college students described their health diets as "good." Due to high workplace and college demands, nurses and nursing students alike find little time to take care of themselves, frequently having limited access to healthy food options, predisposing them to high fast food and caffeine intake. Future research should focus on interventions that influence motivators to increase participation in hospital-based and academic programs to enhance healthy lifestyle for nurses and nursing college students.

Multi-Agent and Decompositional Control for Complex Robot Systems

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Robots, in general, can become very complex quickly. Many different components must come together in order to complete a task. There is a need to investigate how to reduce the complexity of programming robotic systems. Replicating only the human hand, for example, has many degrees of freedom, making it difficult to model. Cooperative multi-agent systems may provide a solution as they will be able to divide the system into several subsystems that can work together to accomplish the objective, reducing the complexity of the problem. However, there are drawbacks in using this approach which is the problem statement. In this paper, a control system design is presented based on a Pioneer2 mobile platform with a mounted Robotica Edubot. The robot is broken down into three agents: mobile platform, arm, and pincer-gripper. Having the goals projected in the workspace, the gripper will lead, directing the body of the robot to the objective. Limitations were placed on the design based on the time span of the project, specifically, the way the robot can perceive obstacles. Currently, the design phase is implemented, and in the future the design will be executed.

The Intersections between Social Class, Marital Status, and Family Composition among African Americans

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This article explores the marriage rate among African Americans and the root causes for its decline. The 1965 Moynihan Report boosted the debate on what has caused marriages among African Americans to wane more than other American racial or ethnic groups. Notable sociologists have argued that the reasons for the decline are due to cultural obstructions, while others have asserted that it is rooted in slavery and segregation. There have been multiple publications on the social class, marital formation, and the family structures of African Americans, which researchers have used for their argument. Data from the 1972-2016 General Social Survey (GSS) is used to answer questions on how African Americans could counteract the marriage decline, while also examining their education level and family composition in comparison with Whites. Results indicate that the more African Americans achieve a higher education, the more the marriage gap closes.

Space Launch Propulsion Analysis and Trajectory Design Considerations for a Trip to the Moon

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A mission to the Moon is an exciting prospect for the future of our American space exploration program. In this paper, we present an analysis of the propulsion system performance to launch a crewed spacecraft to low Earth orbit (LEO) and examine the available rocket technology to propel a space launch vehicle. At the same time, we perform a trajectory analysis to determine the path that the spacecraft will follow from a parking orbit on LEO to its lunar orbit. The results from the trajectory analysis were found by applying the Patched Conic approach. The analysis of the propulsion system performance is based on the rocket equation, which was to include effects due to gravity on the launch vehicle. With the rocket equation now considering the effects of gravity, we estimated the performance of the propulsion systems by comparing the time needed for a single-stage, two-stage, and three-stage launch vehicle to reach LEO. In addition, we calculated the acceleration of the vehicle for single- and multi-stage vehicles since this is an important factor to consider for a crewed launch. It was found that the three-stage launch vehicle fits the acceleration requirements for a mission with a crew of four.

Bioengineered 3D Cell Culture Model for Testing Drug Sensitivity of Breast Cancer Cells

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Proper design of 3D culture techniques is becoming of great importance in intensive cancer research. This is because these 3D models simulate a microenvironment that mimics the strategic interactions between cancer cells and their extracellular matrix (ECM). As a result, 3D culture techniques play a crucial role in the development and testing of cancer therapies in the laboratory. However, there are only few viable 3D platforms available that permit the study of these interactions *in vitro*. Our research entails the development of a bioengineered cell culture film that would mimic the biochemical and mechanical characteristics of the ECM, as well as the crucial cell-cell matrix interactions. A Western blot was performed to evaluate the difference in proteins released from MDA-MB-231 breast cancer cells grown in 2D culture vs those grown on our culture film. The results showed a significant difference in protein expression by the cells grown on the 3D culture film. Also, an MTS assay was carried out to quantify the cell response to drugs in 2D vs 3D culture, using the drugs Paclitaxel and Doxorubicin. The results indicated that there is no significant difference between the viability of the cells grown in the two culture conditions.

Reverse Transcriptase Domain of RC *Bombyx mori* Non-LTR Retrotransposons

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Long interspersed nuclear elements (LINEs) also called non-LTR retrotransposons are an important class of mobile genetic elements. LINEs encode proteins involved in element RNA binding, target DNA binding, DNA cleavage, and reverse transcriptase. LINEs replicate by inserting their genetic material into host genome using a process called target prime reverse transcription (TPRT). The reaction is initiated by the element encoded endonuclease which cleaves the first strand of the host genome DNA. The element reverse transcriptase then uses the cleaved DNA site to prime reverse transcription. The purpose of this study is to better understand the reverse transcriptase domain and its many roles, especially element RNA recognition and reverse transcription. The R2 *Bombyx mori* element (R2Bm) is a site-specific LINE that inserts into a specific site within the 28S ribosomal DNA of the host genome. R2Bm has served as one of several major model systems used to understand TRPT. The structure and role of domain 0 in the reverse transcriptase is not well understood in LINEs. The R2Bm mutant Y/ATQLW/A, a mutation in domain 0 of the reverse transcriptase, was assayed for reductions in TPRT related insertion activities in vitro and data obtained suggest a reduction in reverse transcription.

The History of Lynchings of Mexicans in Texas, 1910-1920

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The lynching of Mexicans is a hidden history in the state of Texas. A spike in the number of lynchings occurred from 1910-1920. Mexicans were lynched during this period because of preexisting stereotypes of bandits, murderers, and thieves. This study explores how these stereotypes and the Mexican Revolution affected the lynching of Mexicans from 1910-1920. The effects of these lynchings through the course of time were analyzed. Spanish newspaper articles and the transcripts of the Investigation of the Texas Rangers were analyzed to see people's reactions to lynchings of this time period. Members of law enforcement have lynched Mexicans in the past based on stereotypes. Today, law enforcement in some cases still act on these stereotypes when they come into contact with Mexicans. Natalia Molina's theory of racial scripts highlights how lives of racialized groups are linked across time and space and thereby affect one another, even when they do not directly cross paths. Future studies should further explore the causes of violence by law enforcement against Latinos.

Latino College Students' Educational Experiences: The Impact of Having Immigrant Parents

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During the last 30 years, research regarding the Latino population in sociology and anthropology has focused primarily on Latino immigrants. Educational research has focused on children of immigrants in K-12. To date, there is little research on these children once they become adults and begin their college journey. Instead of focusing on the immigrants or their children in K-12, the aim of this research is to examine the experiences of first-generation Latino college students with immigrant parents and how they define academic success. Having immigrant parents presents certain barriers to utilizing resources that would otherwise improve their academic outcomes. In order to understand their experiences, I conducted semi-structured interviews with seven Latino first-generation college students which yielded several common themes. These themes centered on their parents' adjustment to the U.S. and impacts of said adjustments on students' college experiences, as well as the students' own conceptualizations and identity formation as first-generation college students. Overall, the struggles presented seemed to help define ideals of success and formed the backbone for their own ideas of how to move the Latino community forward. Given the limited number of interviews, it is difficult to make generalizable claims about the entire Latino college student population.

Matrix Factorizations for Polynomials

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Irreducible polynomials are not factorable in the conventional sense, so having another method to factor these polynomials is important. The factorization method we discuss in this paper uses matrices. The method is called matrix factorization and works whether the polynomial is irreducible or not. Regarding the question of the existence of matrix factorizations, we prove that it suffices to show every homogeneous polynomial has a matrix factorization. We then show that every homogeneous polynomial does in fact have a matrix factorization. These results have been obtained by starting with polynomials of one term and working up from there. When factoring polynomials in the conventional sense, there is only one way to factor them. However, using matrix factorizations, more than one factorization is possible. These factorizations will look different, so we need a precise notion of equivalence. We discuss two definitions of equivalence, Eisenbuds and homotopy equivalence. Results include a theorem showing the conditions required for a polynomial to be factored using a two-by-two matrix, a proposition showing how to make a matrix factorization for a given polynomial and homogenize it for the homogenization of the polynomial, and a theorem showing how to make an arbitrary factorization homogeneous for a homogeneous polynomial.

Analysis of Form and Function in Snakes

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In its native environment, due to nutritional scarcity, the Burmese python (*Python molurus bivittatus*) can regulate its intestinal form and function, rapidly down-regulating during extended periods of fasting between meals and up-regulating after meal consumption. Considerable research has been focused on this specific species, yet few studies have focused on additional species, some of which exhibit similar regenerative phenotypes following feeding, and some of which do not. This experiment sought to observe and compare changes in cellular phenotypes during post-feeding regenerative intestinal growth across several snake species, including species that are known to do negligible regulation. Histological samples taken from the small intestines of Burmese pythons, Diamondback water snakes (*Nerodia rhombifer*) and Prairie rattlesnakes (*Crotalus viridis*) at multiple timepoints spanning the digestive response were stained and imaged. The images were analyzed for temporal changes in cell size to determine if there was variation among the species. It was found that all the species studied displayed an increase in cell size from a fasting state to several days post feeding. Additionally, although thought to do little internal regulation, the Diamondback water snake was found to display intestinal cell growth on par with snakes known to regulate their intestinal form.

Devotional and Civic Identity in the Religious Cycles of the Scuola Grande di San Rocco

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Valued beyond their aesthetic potential, pictorial works during the Renaissance were a way of expressing beliefs through an image rather than the written word. During the mid-16th Century, the Scuola Grande di San Rocco in Venice commissioned numerous paintings from the painter Jacopo Tintoretto for the interior decoration of their meeting house, as was the custom of these institutions. This commission led to a longlasting partnership that produced one of the most ambitious projects undertaken by a single artist. The decorative scheme created was meant to communicate visually to the audience. Thus, the cultural context of such institutions as the Scuola Grande di San Rocco defines their role in society and helps us understand how art served their purpose. An iconographical and iconological analysis of these works demonstrates that despite the religious themes of the series, the stories portrayed contain subjects that were associated with the mission of the Scuola di San Rocco. The works communicated not only the religious conviction of the institution, but also its civic identity as a charitable organization that aided the poor. Thus, the focus of the research is to clarify the relationship between the art commissioned by the Scuola di San Rocco and the institution's identity as both civic and religious organization.

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Fonts Packaged

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COLORS AND INKS

4 Process Inks; 0 Spot Inks

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- Name and Type: Process Magenta; Angle: 75.000; Lines/Inch: 60.000
- Name and Type: Process Yellow; Angle: 0.000; Lines/Inch: 60.000
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Links and Images: 42 Links Found; 0 Modified, 0 Missing 0 Inaccessible

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Printer's Marks: None

Bleed: 0p0, 0p0, 0p0, 0p0

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Trapping Mode: None

Send Image Data: Optimized Subsampling

OPI/DCS Image Replacement: No

Page Size: Custom: 42p0 x 54p0

Paper Dimensions: 51p0 x 66p0

Orientation: Portrait

Negative: No

Flip Mode: Off

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2. McNair 2017 Proceedings-Final-PROOF-2-Print-version.idml; type: InDesign Markup Document; size: 383K
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