



# FALL 2017

## MSU AGEP

### Science Today Bulletin

## Letter from the Editors

We are proud to welcome you to the 5th edition of the Michigan State University Alliance for Graduate Education and the Professoriate Science Today Bulletin! The purpose of this peer-reviewed scholarly publication is to highlight innovative research conducted by members of the Michigan State University AGEF community and share it with the general public. The research you will find in this edition illustrates the breadth of topics and questions asked by a group of incredible graduate students - who are critical collaborators in making the Science Today Bulletin come into fruition. We would like to thank these graduate students for sharing stories of their research, passion, and for the commitment they have tenaciously exemplified in completing their work. This project could not have happened without the support that we received from them.

Pursuing a graduate education today is more difficult than ever before. Graduate students face waves of uncertainty regarding funding sources and a shortage in available faculty positions. The scholars and laboratories included within this publication pursue research that aids in the advancement of science, technology, engineering, mathematics as well as the social science fields that helps make our world a better place. We hope that the work you find in this publication demonstrates the importance of supporting graduate students and their work.

To our prospective authors, the AGEF Science Today Bulletin is a great opportunity to practice showcasing your science communication skills as well as create future platforms to share your research with members at Michigan State and beyond. Submitting to the Bulletin is also strongly recommended for those in our community that are interested in applying for the AGEF Scholar Award. The 2018 AGEF Science Today Bulletin will be accepting submissions September 2018. If you are interested in sharing your work for the upcoming 2018 Bulletin, please visit the MSU AGEF website at [www.grad.msu.edu/AGEF](http://www.grad.msu.edu/AGEF).

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# Opening the Black Box: Experiences of Chinese Graduate Students in a Visiting Scholars Programs

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**Keywords:** international exchange programs, Chinese visiting scholars, transformative learning

## Introduction

This study explores how Chinese visiting scholars make sense of U.S. exchange experiences and how these experiences impact their lives, host, and home institutions. Since China's reopening to the world in the late 1970s, many Chinese professors and scholars have been sent to Western countries to meet the increasing needs of China's socioeconomic and scientific development (Huang, 2012). According to the Chinese Scholarship Committee (2002, 2010) the number of Chinese scholars in U.S. institutions increased from 2,044 in 1996 to 13,038 in 2004. In the past 15 years more than 84,000 visiting scholars have studied in the West (Xue, Chao, & Kuntz, 2015). Xue, Chao, & Kuntz (2015) argue that despite the increasing number of visiting scholars, little research has explored Chinese visiting scholars' overseas experiences. Yan and Berliner (2011) observe that there has been national level interest in Chinese students and scholars coming to the U.S., but not all educational institutions are prepared to satisfy academic needs of these students. There is a need to understand how meaningful these international exchange experiences are for visiting scholars and how these experiences are impacting the institutions in the United States and China.

## Research Questions

1. What are the goals of Chinese visiting scholars who participate in an exchange program in a Midwestern University in the U.S.?
2. What are the scholars' perceptions of the various academic, cultural, and social experiences they have during their stay?
3. How do Chinese visiting scholars make sense of these experiences?

## Theoretical Framework

In this study the inquiry was guided by a sense-making perspective, in which the researchers sought to determine how participants perceived and made sense of the experiences and activities they were engaged in while at their host institution. Using transformative learning theory (Mezirow, 1991; Taylor & Cranton, 2012; Savicki 2008), we wanted to know what meaning perspectives (Mezirow, 1991) participants used to frame and make sense of their experiences, and how these meaning perspectives changed or were transformed through their engagement in the program. Mezirow (1991) defined meaning perspective as "structure of assumptions in which one's past experience assimilates and transforms new experience" (p.42).

## Methods

The focus of this study was an eight-month visiting scholars program at the College of Education at Midwestern Research University. The research participants included 12 female masters' students from a regional Chinese University. The Midwestern research university has strong focus on internationalization through admitting international students and hosting visiting scholars.

This particular program had been underway since past eight years and have gone through many structural and administrative changes due to change in leadership. All participating visiting scholars were studied from the year 2015-16 group. A case study design, informed by ethnographic methods and strategies i.e. in depth interviews, observations, document analysis were used to study how individuals and the group as a whole perceived and made sense of their experiences in this program. Participating scholars and their faculty leader were formally interviewed twice over the program using semi-structured interviews,

and numerous informal interviews and interactions were made over the eight months through nonparticipant observations of numerous activities and events. We also included content analysis of relevant documents such as orientation documents, emails, and reading materials used in this program.

## **Findings**

Participants saw this program primarily as an opportunity to obtain an international credential that will further their own personal and career goals. They perceived this experience as an opportunity to increase their fluency with English and to use resources available in the host institution and country to further research they initiated within their graduate programs in China. Participants reported that experiences with their American peer mentors were instrumental in their transition to the new academic and research culture. They found these relationships to be quite meaningful, and indicated a desire to maintain this relationship on their return. The scholars indicated their faculty mentors, however, were not easily approachable, due to their busy schedules, and relationships with them were less meaningful. The scholars expressed a strong desire to interact with American students and learn their language and culture, but they were not able to make many American friends during their stay. Several scholars, however, mentioned their involvement in a community Bible study program as a place to meet new friends and to practice their English.

## **Implications**

These findings contribute to an emerging scholarship on the meaningfulness of visiting scholars programs that many Western universities sponsor. The findings suggest that the scholars in this program were actively involved in constructing and reconstructing the meaning of their experiences and exercised agency in creating their own learning experiences within existing structure of the program. This study shows that these programs have profound impacts on participants' lives in terms of learning new skills, and expanding their knowledge and worldview. The program provided a number of opportunities for transformative learning, but our data does not provide strong support for transformation among the scholars. The findings also underscore tensions within the program such as clear alignment of goals and purpose of both universities need to be addressed to make the experiences meaningful and transformative for participants.

## **Future Work**

Our study underscores the need for longitudinal study to further understand the impact of international exchange programs on the lives of visiting scholars after their return to their home countries. Also it will be beneficial to study the experiences of a diverse group of visiting scholars from different countries to understand the differences of their experiences based on their gender, race, ethnicity, and field of study.

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# Knowing and Being: Black Women Educator's Literary Works on Being and Teaching Black Girls

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**Keywords:** black girls, poetry, P-12 education

## Introduction

Black girls face disproportionate physical, emotional, and social harm due to institutional and structural inequities predicated on race, gender, and social class (Morris, 2016; Nunn, 2016). For example, in school-based settings, Black girls experience sexual harassment and assault at higher rates than their non-Black peers (Tonnesen, 2013), their behaviors are often perceived by teachers and administrators as aggressive and unladylike by (Morris, 2007), and they are overrepresented in school arrests and referrals to law enforcement (Morris, 2016). These studies illuminate the ways in which Black girls are disproportionately affected by policies and practices that pathologize Black girls' ways of knowing and being.

This study uses the literary works of two Black women educators as "real and legitimate sources of data" (Brayboy, 2013, p. 92) by centering their narratives on being and teaching Black girls. When Black women tell their stories, they challenge the hierarchies surrounding whose stories are told, how it gets told and who does the telling. In recognizing that the silence around the experiences of Black girls and Black women educators are rooted in epistemological concerns, I operationalize Black feminist epistemology as a means of engaging with Black women's experiences from an intersectional perspective (Hill Collins, 2000). In particular I investigate the following questions:

- How are the experiences of Black girls captured in poems and other written work produced by two Black women educators?
- How are the educational and teaching experiences of two Black women educators connected to their identities as Black girls/Black women?

## Methods

This study is primarily based on a document analysis of poems, essays, blog and social media posts authored by the participants. Zee is a former NYC public school teacher and continues to work for the NYC Department of Education. Bre is presently a kindergarten teacher at a charter school in NYC. Prior to the start of this study, I sent both women a copy of a personal essay I wrote, "tRaceing Herstories: Reflections on Black Girl Resilience, Pain, and Healing". I wanted to share this work with both women in order to provide some context about the experiences that led me to the development of this particular research study. Over the course of two-months, I communicated virtually and in person with both women. We used the pieces that they authored as a starting point for semi-structured conversations. I transcribed and analyzed these conversations by drawing connections between their writing and other literature.



## Findings

Three themes emerged within the literary work produced by both educators and through my conversations with them 1) Witnessing and testifying is an approach used by Black women educators to humanize and call attention to the experiences of Black girls; 2) Aspirations and affirmations are sources of strength in efforts to push back against dominant narratives about who Black women are or should be 3) Self-care and Expressions of Self is essential in nurturing the intellectual, emotional, and spiritual wellness of Black women and Black girls.

## Broader Implications

In an attempt to step away from “damaged centered” narratives (Tuck, 2009), I engage in a more discourse that acknowledges that Black girls and Black women are more than resilient; they are also joyous, intelligent, creative, curious, and innovate and so much more. In doing so, I hope to present a more complex understanding of how Black girls and Black women educators make sense of their race and gendered experiences within and outside of schools. This study is significant due to concerns that arise as a result of the changing demographics of students in public schools and increased efforts to recruit teachers of color. Diversity in physical presence alone is not enough to build a more just and equitable public school system. The increased recruitment of teachers of color, calls for concerted retention efforts geared towards supporting incoming teachers as well as those already in the classroom. These efforts should include a continuous examination of how the intersections of race and gender impact teacher experiences inside and outside the classroom.

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# The Effect of Taboo on Employee Helping Behaviors

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**Keywords:** taboo, coworker relationships, authenticity, impression management, helping behaviors

## Introduction:

The American Psychological Association (APA) found that over 25% of workers feel political discussions in the workplace cause at least one negative consequence at work, including feeling more workplace hostility from coworkers and decreased team cohesiveness (APA, 2016). The popular press and Human Resources Managers generally advise employees to stay away from conversations that involve potentially divisive topics, yet they continue to appear in the workplace. I conceptualize politics, religion, sexual relationships, and other possibly contentious topics as taboo in the workplace. Per the Merriam-Webster definition, I further define taboo as something banned on grounds of morality and taste (Taboo: Merriam Webster, n.d.). Given the negative consequences suggested by the APA survey and other recent studies, I considered how negative interpersonal consequences could affect work-related behaviors. One important behavior that is dependent on positive coworker relationships is helping behavior. Helping behavior occurs when one employee voluntarily assists another with work-related tasks, and is a strong predictor of employee performance and organizational effectiveness (Chou & Stauffer, 2016). I use helping behaviors to understand the effect of taboo on employee relationships by asking the following question: How does taboo in the workplace influence employee helping behaviors?

## Theoretical Framework:

The organizational literature has yet to consider taboo in the workplace. To provide a theoretical framework, I turn to constructs that may explain reactions to taboo. First, authenticity, or “the unobstructed operation of one's true, or core, self in one's daily enterprise” is a possible construct that describes a reaction to taboo (Kernis, 2003). In practice, some organizations encourage workers to be authentic by “bringing their whole self to work” as a part of company culture. Another construct that describes a reaction may be impression management (IM), which is the construction of a positive- and often professional- image for the purpose of affecting others' views (Roberts, 2005). Some organizations promote this behavior by pushing the organizational image of professionalism over individualism.

I hypothesized that employees will respond to taboo based on the behavioral characteristics promoted within the organization (i.e. authenticity or IM). In organizations that promote authenticity, I predict a positive relationship between authenticity and helping behaviors. However, I expect this relationship to be moderated by the degree to which individuals agree on the taboo topic such that disagreement (compared to agreement) on the topic will be associated with less helping behavior. In other words, I expect employees that are given permission to “be themselves” will help others if they agree on a taboo topic, and not help if they disagree. In organizations that promote IM, I predict that greater IM will be associated with more helping behaviors, anticipating that employees will help just to maintain a positive image regardless of their views of the taboo.

## Methods:

To test these hypotheses, I employed an experimental design using 390 participants recruited through a Midwestern university's research pool. The sample was majority White Non-Hispanic (71.5%) and female (81.2%) with an average age of 19.63 (SD = 1.4 years).

Participants were either assigned to work for a company that encourages authenticity or professionalism (i.e. IM) then paired with an online “coworker” to get to know through a series of four computer-mediated prompts designed to stimulate conversation in this study. During these prompts the fictitious coworker brought up a taboo topic such as abortion or same sex marriage, or a non-taboo topic such as fitness, for which they expressed an opinion. Next, the pair was assigned to complete a task for the company. The participant had five opportunities to help the coworker or choose to finish the task. For the last part of the study, participants completed measures about their experience such as task liking and coworker liking before completing measures of state authenticity and IM.

This project is currently in the data collection stage. Once the data is received, I will use Analysis of Variance (ANOVA), a test of group means, to analyze the difference in taboo reactions and helping behavior from those in the authenticity condition and those in the IM condition. To test the moderation between authenticity and helping behavior, I will use step-wise hierarchical linear regression which first estimates the main effects independently, then estimates the relationships between the main effects that produce interaction effects. If the interactions are significant, it will indicate that a person in a workplace that encourages authenticity will have different helping behaviors if they encounter a taboo topic that they agree with than if they encounter a taboo topic they do not agree with.

### **Implications and Future Research:**

These results may have significant implications for the field of organizational science by contributing an understanding of taboo as a construct important to organizational functioning. Additionally, this research may also reveal psychological processes and aspects of human relationships that are of interests to areas of psychology, sociology, and political science. A better understanding of the organization’s role in taboo will also extend into practice by suggesting best practices for HR managers and employees to have (or avoid) difficult conversations in the workplace.

One limitation of this research is that the participants only experienced the organizational influence briefly rather than the emersion of culture that one would experience in a workplace. Additionally, I consider very general, societal taboo; however, taboo may differ based on the actual workplace. Future research will directly address these limitations by collecting field data from actual employees. The goal of this research stream is to explore the boundary conditions of taboo and coworker relationships by honing in on the circumstances under which taboo has the power to disrupt social dynamics.

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# Culturally Responsive Goals in Waterville: A Case Study

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**Keywords:** culturally responsive practice

Culturally responsive practices (CRP) is one approach educators utilize to improve the achievement and discipline gaps that exist in U.S. schools. Culturally competent teachers uphold the cultural knowledge, references, and experiences of racially and ethnically diverse students but also hold them to high standards in order to make schooling more relevant and effective for student (Gay, 2010). Current research provides insight into singular experiences of both school leaders and teachers working individually to enact CRP (Khalifa, Gooden, & Davis, 2016; Ladson-Billings, 2009). While these studies indicate pathways to access CRP in singular settings, more studies are needed to consider CRP intervention at the school district level. Gamson and Hodge (2016) describe the school district as “understudied” in educational research and call for researchers to “look for ways that local districts can proactively adapt to changing circumstances while also fostering the kind of powerful instructional practice that will ensure future student learning” (p. 241). The purpose of this study is to explore how a public school district entity envisions, promotes, and pursues a common goal of implementing CRP.

CRP emerged in Waterville Public Schools (WPS) as a district initiative to improve the schooling experiences for Black and Latinx students by implementing practices to close achievement and discipline gaps. WPS is a pseudonym for an urban school district located in the Midwest comprised of approximately 4,000 students, a majority of whom are Latinx. Using a case study approach, I explored one school district engaged in culturally responsive practices. Case study is ideal because it allows for the exploration of a phenomenon within the actual context (Yin, 2003). The case study is intentionally bounded as a single case of one school district. Although my participants were located at different school sites, they remain part of the same district, or entity that encompasses a group with shared culture, objectives, and goals (Goldring & Sims, 2005). Drawing upon organizational learning theory, I explored the perceptions about the systems that encourage the collective learning and change in practice for the school district. Utilizing qualitative methods, I conducted two interviews each with the superintendent, four principals, and six teachers at four different school sites within the district. I also observed the teachers twice in their classrooms. All interview data was transcribed and uploaded into MAXQDA, a qualitative data analysis software, where it was coded for emerging themes. In order to create structural coding, I developed initial codes based on the literature. During the coding process, I composed analytic memos, or mini analyses, as a way to make sense of and continually engage in the analysis of the data to find common themes related to the schools district goals to become culturally responsive.

Preliminary findings suggest that lack of understanding and inability to reflectively practice strategies to become culturally responsive may inhibit the implementation of CRP throughout the district. School-level leaders and teachers do not fully understand the larger vision and priorities of the overall district. Teachers described feeling frustrated that their work was undervalued as evidenced by shifting and changing initiatives. They were also unclear how larger CRP concepts they had learned in professional development sessions could be directly applied in their classrooms.

This study presents factors to consider when implementing district-wide professional development plans for teacher practice. Peer modeling and learning groups can provide pathways for school leaders and teachers to understand broader initiatives as well as practice peer-to-peer mentoring for culturally responsive practices. Working with school districts to establish professional development models that include teacher understanding around broader district goals and how they can be conceptualized through cultural responsiveness can create continuity and clarity for both school leaders and teachers.

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# Early Immune System Education by the Infant Microbiome and Allergy Development

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**Keywords:** microbiota, bacterial taxa, antibodies

## Introduction:

The human gastrointestinal (GI) tract is home to a large and diverse community of microbes. During early life development various bacteria enter the body, forming the innate and adaptive immune responses. The entirety of all microbes within the human body is known as the microbiota. The gut microbiota (GM) acts as an additional organ, playing essential roles such as providing protection from disease-causing bacteria and helping to metabolize nutrients. This study examines how the early development of the GM, along with immune system education, can affect allergic outcomes.

Preliminary data was collected from babies born on the Isle of Wight, England. This data gave insight into the composition of infant microbiota. It was suggested that the risk of allergy development might be associated with high proportions of specific groups bacterial families (taxa) colonizing the GI tract. Bacterial taxa are designated as a group or groups of organisms closely related based on their genetic profile. Investigating bacterial DNA (16S rDNA) helped determine the identity of the bacterial taxa within the infant microbiota samples. We observed trends indicating that specific taxa might play a role in allergy protection or as an allergy enhancer (specific taxa data omitted). We set out to develop a mouse model to study this observation. Our strategy was to transplant a young adult human microbiome into C57BL/6 mice, then expose them to the allergen House Dust Mite (HDM), and assess their allergic response. Groups of mice were also infected with *Campylobacter jejuni* 260.94 to enhance allergic response by shifting the immune system to an allergy-biased state. Our model was based on the following hypothesis: Mice carrying an adult human microbiota and infected with *C. jejuni* 260.94 or 1168 that induce allergy associated Th2-biased immune response, will show exacerbated allergic responses to a known human allergen.

## Methods:

Mice were divided into two groups, one transplanted with the adult humanized microbiota (HuMice) and the other carrying the normal (conventional) mouse microbiota (CoMice). Both HuMice and CoMice groups were infected with *C. jejuni* 260.94 for 3-4 weeks. Mice received 6 doses of house dust mite allergen (HDM) by nasal gavage. On day 14, lung functions were measured with the flexiVent (SCIREQ Inc. Montreal, QC, Canada). Then, mice were humanely euthanized and blood, bronchoalveolar lavage (BAL), lung, fecal, and GI tissue samples were collected for further analysis. These analyses included measuring levels of antibodies (allergy associated proteins) in the blood to determine the severity of the allergic reaction. Also, total cell counts were performed on the BAL fluid to investigate immune cell recruitment due to an allergic response in the lungs.

## Results:

Initial results indicate that allergen exposure impacts lung physiology and function. Antibody profiles that would indicate an allergic response were analyzed in collected blood plasma samples. We observed increased levels of allergy-associated antibodies dependent on *C. jejuni* infection status or microbiota

status. Healthy lungs perform at a certain standard, and the flexiVent machine is able to measure changes in lung integrity based on disease manifestation. The flexiVent evaluation of lung function showed variable interactions in several parameters that measure physiological changes such as lung tissue elasticity. These results led us to conclude that our model is working in the C57BL/6 mice and we were able to sensitize them to HDM. Also, in our model the microbiota does play a role in severity of responses to an allergen.

#### **Future Work:**

Our following experiments will repeat transplanting additional human microbiotas into C57BL/6 mice, and observing their effects on allergy response. Also, analyzing the microbial communities of interest using computational tools to investigate total bacterial genetic profiles (Bioinformatic & Omic's techniques). This is being done in order to determine whether the preliminary results that led to this study are reproducible. With a functioning model, we should be able to determine whether our specific bacterial taxa proportions of interest impact the allergy outcome.

#### **Broader implications**

Our data suggest that a functioning mouse model has been achieved in C57BL/6 mice. With this model we may be able to evaluate potential probiotic effects of specific taxa on allergenic disease outcome. The Centers for Disease Control reported 25.7 million people in the US, including 7.0 million children under age 18, are affected by allergy. This is an ever-increasing issue and impacts the health infrastructure of developed and developing nations.

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# Women of Color: Ready but Not Running

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**Keywords:** candidate training programs, representation, women of color

## Introduction

Over the past few decades, women have made historic gains electorally, yet, they remain tremendously underrepresented in the political arena making up only 24.6% of state legislators and 19.4% of Congress (Center for American Women and Politics, 2016). Many researchers connect this issue to an existing glass ceiling— defined in 1995 by the Federal Glass Ceiling Commission as an invisible, yet inaccessible barrier hindering minorities and women from working up the ladder despite exceptional achievement (Folke and Rickne 2014). Other scholars like Lawless & Fox believe young girls' lack of exposure to political discussions, lack of involvement in competitive sports, and lack of encouragement to pursue political careers created a political ambition deficiency amongst women which contributes to this phenomenon (2008).

In this study, I am characterizing a sample of women to understand how they compare to other latent candidates— those who refrain from pursuing public office despite being well-qualified and experienced. With my research question, I am seeking to discover the qualifications of minority women completing candidate training programs which prepare women to run for political positions by providing information regarding campaign fundraising, public speaking, etc. I hypothesize that women of color are more likely to be latent candidates even though they are competent and possess significant political familiarity.

## Methods

Data for this study was collected from the official websites of the Maryland, New Jersey, and Virginia chapters of Emerge America— an intensive, Democratic candidate training program with a mission of preparing women from diverse backgrounds to run successful political campaigns. These states were selected as focus states because of their high minority populations. Using LinkedIn accounts, resumes, curriculum vitae, and other public information, I was able to find information that was missing from the candidates' profiles on the various Emerge websites.

The data file includes a number of variables: race, college education, highest degree attained, profession, party involvement, political staff, and “ran for office”— upon completion of the program. Due to the low number of observations, I used descriptive statistics to analyze the data using race as an indicator variable for all other variables. To determine race, I examined phenotypic characteristics like skin color, last name, and patterns of participation in organizations such as National Association for the Advancement of Colored People or Hispanic National Bar Association (Harris 2002). Race is a dichotomous variable characterized as white or “minority” which includes Blacks, Hispanics, Asians, Native Americans, and Middle Eastern women. College education is also a binary variable. Highest degree attained is quantified by degree ranging from bachelor's degree to professional degree specifically Juris Doctor. Profession is classified based upon the traditional candidacy pool— the concept that traditional candidates have legal, education, or business backgrounds (Moncrief, Squire, and Jewell 2000). Thus, this variable is categorized as law, education, business, and other. Party involvement refers to participation in party committees or serving as a party delegate.



Political staff refers to campaign experience or employment as staff for elected officials. Lastly, I used Ballotpedia to discover if any of the women have run for office since completing the program. Each of the three are dichotomous variables.

## Results

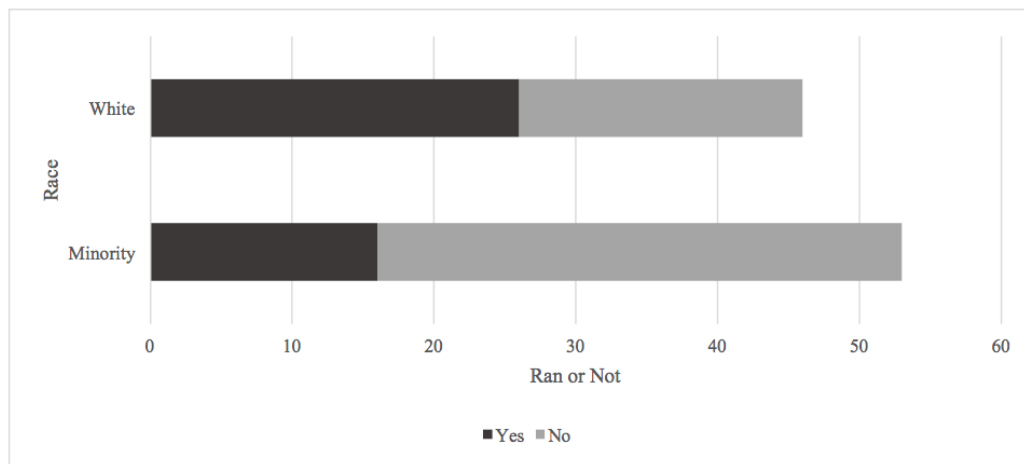


Figure 1: Race & Ran or Not

According to the data, women of color are traditional candidates, have surpassed white women in educational attainment, and are more politically involved; however, they are running at a lower rate than white women after completing the program (figure 1). Thus, these findings support my hypothesis.

In examining the results, many possible influencing factors present themselves. For instance, the percentage of minority women running for office upon completion of the program could be low because gender specific programs do not fully prepare women of color. While they discuss fundraising strategies, they may fail to connect women of color to organizations willing to provide financial commitments. So, candidate training programs that are both gender and race specific may produce better results because they cater directly to intersectional needs through partnerships with other groups who have similar missions. Party leaders' recruitment of women and the racial makeup of parties could also negatively influence results. For instance, Republican Party leaders' have a history of not recruiting women. This disparity grows when you look at the recruitment of minority women in particular. Questions as such and others alike can be solved by expanding the scope of this project.

Currently, there is no existing literature examining latent candidates by both gender and race so the trajectory of this project is promising. While scholars have successfully linked lack of minority and women candidates to disproportionate electoral outcomes, they have failed to describe latent candidates. Thus, looking at candidate training programs in this context is a good way to collect information on them.

The main limitation to this work is the small sample size. By expanding the sample size, the data will be more useful in a number of ways. Not only will it be prime data for quantitative analysis with good

external validity, but it will also serve as an influencing foundation for more robust research questions.

### **Future Work**

Moving forward, I plan to expand the sample size to include more white women and both minority and white men. By doing so, I will be able to test for statistical differences between both groups when analyzing the variables. This will also allow me to make stronger comparisons between the groups. Once the sample size is increased, I plan to pair it with preexisting candidate training program data which has similar demographics and variables. Not only will this add more variation to the project, but it will also allow me to examine how the qualifications of women completing gender-specific candidate training programs differ from the qualifications of those completing more inclusive candidate training programs. Once all of this data is collected and candidate training program participants can be empirically described, I plan to use this information to examine electoral factors that influence underrepresentation beyond what exists in the literature.

### **Implications**

This research brings awareness to the dire need for equivalent representation amongst all ethnic groups in American politics. This study also has the potential to influence structural improvement of initiatives created to increase the number of women of color in public office such as candidate training programs.

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# A Review of Production Processes, Effects of Feedstock and Production Temperature of Biochar Obtained as Part of a Bioenergy Platform

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**Keywords:** biochar, pyrolysis, biofuels

## Introduction

Due to the need for energy security and the implication of burning fossil fuels as one of the major contributors to climate change,<sup>1</sup> the production of biofuels from plant matter (biomass) has become a very important current topic. As such, biofuels have been championed as a means of producing energy, offsetting carbon dioxide emissions, and helping revive rural economies. However, the production of fuels from biomass draws concerns about the impact of the bioenergy platform on global food supplies, the environment, and global economy.<sup>2</sup> Current biomass to fuel conversion processes have several shortcomings that need to be addressed. For example, harvesting biomass and crop residue for bioenergy could lead to increased land use and GHG emissions, affect soil and water quality due to crop residue removal, impact carbon sequestration and global climate due to loss of organic matter and increased fertilizer use.<sup>2</sup> Furthermore, current bioenergy production systems face various technological and economic challenges such as the economic issues of harvesting and transporting low-density biomass and barriers in industrial scalability.<sup>2</sup> Consequently, bioenergy production processes that provide a way to sequester carbon while producing viable fuels have a very promising potential.

Processes that use heat to breakdown biomass (thermochemical conversion processes) can provide one way of tackling some of the concerns that are previously mentioned due to the many benefits of biochar. Biochar, one of the three major products of thermochemical conversion of biomass, is a charcoal-like material that can be used for soil amendment, carbon sequestration and the removal of pollutants from the environment consequently making it a possible “*key to sustainability*”.<sup>3</sup> (Figure 1). With the establishment of decentralized thermochemical conversion facilities in rural communities around the U.S., biomass can be converted to biochar for soil amendment and carbon sequestration. Furthermore, thermal conversion of biomass can produce bio-oil, a potential liquid transportation fuel. This system has the potential to reduce U.S. oil consumption by 25%, emissions by 10%, and enhance soil and water quality along with improving agricultural productivity.<sup>2</sup> Since several factors affect the yield and quality of biochar, understanding these factors is beneficial for producing biochar with the desired properties. This paper will briefly discuss production processes and the conditions that affect the properties and stability of biochar to inform the reader about the data available in the literature regarding these parameters and their effect on the biochar produced.



Figure 1: Biochar properties relevant to agriculture and water treatment

### *An overview of biochar production processes*

Biochar can be produced from different types of feedstock and be designed for various applications using thermochemical processes such as pyrolysis. Pyrolysis is a process whereby biomass is heated at high temperatures usually in the absence of oxygen to produce three major products: bio-oil (liquid), biochar (solid), and syngas (gas).<sup>4,5</sup> Bio-oil is one of the products of pyrolysis that can be used as a liquid fuel. However bio-oil has several undesirable properties such as low pH, high reactivity during storage, relatively low higher heating value (14-18 MJ/Kg) and high water and oxygen content.<sup>6</sup> For bio-oil to be an economically competitive fuel, upgrading (improving fuel value) is needed to enhance stability and energy content.<sup>7</sup> The syngas usually has a higher heating value (HHV) of about 6 MJ/Kg and can be used for heat and power production.<sup>2</sup> Biochar, with an HHV of 18 MJ/Kg, not only has a potential to be used for heat and power production but it can also be used for soil amendment and carbon sequestration.<sup>8</sup> Biochar has the potential to improve soil prosperities by decreasing soil bulk density,<sup>9</sup> increasing soil pH, nutrient retention, cation exchange capacity, and water retention.<sup>10</sup> By manipulating several factors, the yield and properties of the above-mentioned pyrolysis products can be altered. Depending on the reactor temperatures and residence time, thermochemical processes can fall under several categories. As shown in Table 1, at temperatures between 200-300°C torrefaction can be used to produce up to 90% biochar.<sup>11</sup> Slow pyrolysis at >400°C and a lower heating rate can produce up to 35% biochar.<sup>2</sup> Fast pyrolysis, on the other hand, involves rapid heating at similar temperatures as slow pyrolysis to produce high bio-oil yields.<sup>2</sup> Flash pyrolysis produces about 60% biochar in moderate to high pressure environment.<sup>2</sup> Gasification is designed to maximize syngas yields and can only produce 5-15% biochar.<sup>2</sup> Varying the conditions can help in producing the desired products.

### ***Effect Feedstock Types and Production Conditions on Biochar Properties***

In order to achieve the desired outcomes from biochar use, it is important to understand the effects of feedstock and production conditions on biochar properties such as yield, carbon content, carbon stability, pH, surface area, ash content, and surface properties. Different feedstocks have different thermal degradation profiles and conditions such as reactor temperature and heating rate have significant contributions to biochar properties.<sup>12</sup> Depending on the feedstock, properties of biochar can

vary greatly. For example, biochar from woody biomass shows a different production rate of volatile matter and char at different temperatures. Due to the presence of lignin and its resistance to thermal degradation, low-temperature biochars from woody biomass can exhibit high volatile matter content.<sup>13</sup> On the other hand, feedstock such as rice husk, produce biochar that is high in ash content possibly caused by the complex interactions of organic and inorganic components during pyrolysis.<sup>13</sup>

Table 1: Different thermochemical properties and their products <sup>2</sup>

Process	Torrefaction	Slow Pyrolysis	Fast Pyrolysis	Flash Pyrolysis	Gasification
Conditions		Slow heating	Rapid heating (less than 1second)	Moderate to high pressure in retort	Small amount of oxygen
Temp	200-300°C	>400°C	>400°C		800-1200°C
Yield (wt%)	90% or more solid	35 – biochar 30 - bio-oil 35 - gas	10 to 30 – biochar 50 to 70 – bio-oil 15 to 20 - gas	40 - bio-oil and gas 60 - biochar	5 to 15 - biochar Traces - bio-oil >85 - gas

In addition to feedstock properties, one of the main contributors to biochar properties is related to the production temperature. Generally, an increase in temperature of the pyrolysis reactor results in decreased biochar yields. Irrespective of biomass type, as the reactor temperature increases there is an increase in the decomposition of the biomass, which results in increased production of bio-oil and gas but a decrease of biochar yields by about 10%.<sup>14</sup> Additionally, increased temperature also results in higher carbon content and increased recalcitrant carbon which is highly relevant to the carbon sequestration aspect of biochar application.<sup>13</sup> Based on elemental analyses of biochars, results from different studies show that high-temperature biochars have decreased oxygen, hydrogen and nitrogen content due to increased volatilization of these elements at high temperatures leaving biochar high in carbon content.<sup>15</sup> When considering heating rate, biochar yield also decreases with increasing heating rate; although there does not seem to be a significant effect on char yields due to the interaction of the temperature and heating rate.<sup>12</sup> To this end, when deciding on production parameters one needs to consider the implications of biochar yield vs. biochar content of labile and recalcitrant carbon depending on the specific application.

Besides the yield and carbon content of biochar, properties such as pH, surface area, and thermal stability are also crucial to soil amendment and the impact of biochar application on soil health. Increasing reactor temperature increases pH possibly due to the presence of non-pyrolyzed inorganic elements present in the biomass.<sup>16</sup> Surface area and thermal stability of biochar also increases with increasing reactor temperature possibly due to the release of volatile and thermally unstable

components of the biomass leaving behind a highly porous biochar that is resistant to further thermal degradation.<sup>15</sup> Biochar with high surface area is beneficial for better soil aeration, improved soil water retention, better nutrient holding capacity, improved cation exchange capacity, and improved water treatment capabilities.<sup>2</sup> But care must be taken when choosing biochar for different applications as each individual soil system has its own requirement and the interaction of different biochar properties can have both desirable and adverse effects on plant growth and yield.

## Future Outlook/Conclusion

Even though biochar has potential for carbon sequestration and soil amendment, its influence on different soils and different applications has not yet been well defined. Since the interaction of soil and biochar is as complex as the properties of biochar itself, the long-term impacts of biochar application on soil ecosystems and the environment in general is uncertain. Several studies have recently been conducted on different types of soils to assess the impact of different types of biochar on each system.<sup>17,9,18,19</sup> Still, current research fails to provide concrete evidence about the long-term implications. As biochar has great potential for soil amendment and global climate change mitigation, further studies on its long-term impact is needed to assure positive outcomes from biochar production and future application.

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# General DC-Link Capacitor Expression for Electric Vehicles' Wireless Chargers

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**Keywords:** dc-link capacitor, resonant network, wireless power transfer

## Introduction

With the present trend of reducing carbon emissions to the environment, electric vehicles (EVs) have become a popular topic for the scientific community. The main target is to increase the number of EVs on the road, while decreasing the number of conventional fuel cars. One of the many ways to achieve this is by extending the EVs' driving range, and wireless power transfer (WPT) is one of the most promising technologies to accomplish this goal (Ning, Miller, Onar, White & Marlino, 2013). With this technology, a charging coil is on the ground and a pickup coil is located at the bottom of the EV receiving power wirelessly to charge its battery bank. This allows the concept of roadway-powered EVs (Onar, Miller, Campbell, Coomer, White & Seiber, 2013), where an EV can be re-charged dynamically (while driving), boosting the battery state of charge each time the car goes through a charging coil, thus, extending the EV's driving range. A proper energy storage and charging system design could reduce the required EV battery capacity, minimizing the weight and the high initial cost of these cars (Musavi, Edington & Eberie, 2012).

One of the key components in this wireless charging system is the dc-link capacitor ( $C_{dc}$ ), which is mainly used to keep the voltage variation (ripple) in the system within a desired limit to avoid overheating of the batteries and prolong their lifetime. The value (size) of this capacitor is typically chosen based on the nominal voltage across it ( $V_{dc}$ ) and the system's rated power ( $P_{rated}$ ) according to the following relationship:

$$C_{dc} = \frac{P_{rated}}{2\pi f_g \Delta \tilde{v}_{Cdc} V_{dc}}, \quad (1)$$

where  $\Delta \tilde{v}_{Cdc}$  is the desired voltage ripple across  $C_{dc}$ , and  $f_g$  is the grid frequency (60 Hz in U.S.). Since this equation only considers a single operating condition of the system (i.e., battery bank demanding full power), and does not consider the system control variables (which are continuously changing depending on the demanded power from the battery bank) or the wireless charger topology, it was hypothesized that the equation was not reliable which may lead to an over-sized capacitance. This will make the system bigger, heavier, and more expensive than necessary. In this study, a general expression for the dc-link capacitor is derived as a function of the wireless charger topology components, the system control variables, and the power demanded by the battery bank. As a result, every operating condition of the system is considered when choosing the capacitor size, allowing the designer to obtain the optimum (minimum) dc-link capacitance for any wireless charger topology.

## Analysis and Results

In order to derive the equation it was assumed that the system is ideal and therefore there is no losses in it. Other assumptions were made but are out of the scope of this brief. After imposing our assumptions the following equation was derived:



$$C_{dc}(x_1, x_2, x_3, wcc, P_{bat}, \Delta \tilde{v}_{Cdc}, f_g) = \frac{I(x_1, x_2, x_3, wcc, P_{bat}) \sin\left(\frac{\pi x_2}{2}\right) \cos(\arg(I(x_1, x_2, x_3, wcc, P_{bat})))}{\pi^2 f_g \Delta \tilde{v}_{Cdc}}, \quad (2)$$

where  $x_1, x_2, x_3$  are the three control variables of the system,  $wcc$  is a short for the components of a specific wireless charger topology,  $P_{bat}$  is the power being demanded from the battery bank,  $I(x_1, x_2, x_3, wcc, P_{bat})$  is the current flowing into the charging pad, and  $\arg(I(x_1, x_2, x_3, wcc, P_{bat}))$  is the phase angle of the aforementioned current. This equation is highly non-linear but can be analyzed by using Fig. 1, which shows the behavior of  $C_{dc}$  as a function of  $x_1$  for different battery power demand of a specific wireless charger topology. In order to compare the conventional and proposed equation, this figure also shows the capacitance value that is obtained with equation (1). It is worth mentioning that in this plot  $x_2$  and  $x_3$  are fixed to a specific value, the wireless charger topology is fixed meaning that the components in the wireless charger ( $wcc$ ) are also constant, and  $\Delta \tilde{v}_{Cdc}$  is fixed based on the system specifications. Notice that the capacitance requirement dramatically changes as  $x_1$  and the battery power demand change. A similar behavior can be observed when keeping  $x_1$  and  $x_3$  constant while varying  $x_2$ , and when keeping  $x_1$  and  $x_2$  constant while varying  $x_3$ . This information is hidden in the conventional equation (notice that equation (1) just provides a single point or capacitance value), which shows why this equation is not reliable for every operating condition of the wireless charger. The way to select the optimum  $C_{dc}$  depends on the operating range of the system and is out of the scope of this brief. It is important to note that in a real system there will be some losses which were not considered in this analysis, and therefore, the capacitance needed will be a bit higher than the one obtained with the proposed equation. If the reader is interested, technical details and simulation results of this work can be found in (González-Santini, Ozpineci, Chinthavali & Peng, 2017).

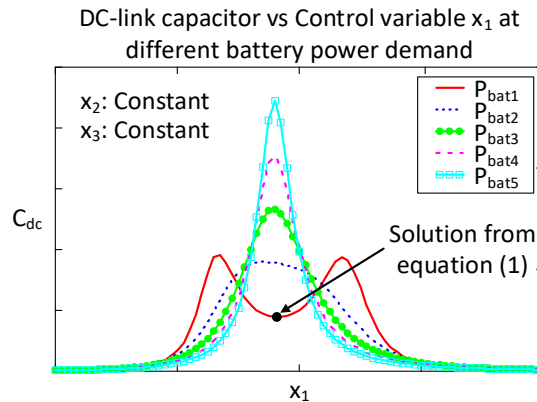


Fig. 1. Graphical representation of the proposed equation for the dc-link capacitor

### Future Work

Current work is focused on validating the analysis and simulations with experimental results, and comparing the  $C_{dc}$  needed in different wireless charger topologies (to see which topology requires less amount of  $C_{dc}$ ).

### Broader Implications

This study expanded the design guidelines for EVs' wireless chargers. These type of advancements are key to promote the mass development and adaptation of EVs, speeding-up the replacement of fossil-fueled-based vehicles. This translates to a potential reduction in carbon emissions to the environment.

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# The Articulation of Multiplicity: A Black Lesbian Poetics Methodology

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**Keywords:** queer theory, poetics

Research Question: How can we imagine a queer futurity through the lens of Black Lesbian poetics?

My graduate areas of study include 20th and 21st century African American literature, Black Feminist Thought, Poetics, Decolonial Thought, and Queer Theory. Integrating these areas of study, I investigate ways to theorize Black lesbian poetry and prose to highlight the robust Black lesbian theoretical underpinnings that can be located in this body of work. My current research examines writings that emerged during the Black feminist movements in the 1970s, wherein the personal and political identities of Black lesbians materialized in verbal and written self-definitive proclamations. This generation of lesbian women of color employ experimental forms of writing, namely poetry and prose, to address the material reality of their intra-marginalized positions, while simultaneously affirming their sexual agency and same-sex attraction. I argue that Black lesbian poetry and prose must be read as an articulation of multiplicity, which is a verbal, written, or aesthetic expression of one's decolonial subjectivity. I coined this term, articulation of multiplicity, so that it may be used as 1) a methodology for works produced by black lesbian writers, and 2) a hermeneutic tool to examine and explicate the sexual nuances that are particular to black lesbian writing.

In this project, I juxtapose works by Audre Lorde, and Cheryl Clarke to underscore how salient their intersectional identities were and still are to the public articulation of sexuality, and the scholarly engagement of sexual politics. Although these writers have origins that are geographically different, their writings are transnational in scope, and their themes of love, desire, and reason allow them to coalesce across their spatial borders. Ultimately, the political goal underlying this project is coalition building<sup>1</sup>. The articulation of multiplicity as a methodology, then, is a possible epistemic resource for working across difference<sup>2</sup>.

The articulation of multiplicity is a particular methodology that is useful for understanding the experimental forms of writing that lesbian women of color employ in poetry and prose. By articulation I mean, verbal, written, and aesthetic forms of expression, and by multiplicity, I am describing a pronounced self that is plural<sup>3</sup>, contradictory, shifting, queer, decolonial, and political. As a methodology, these terms conjoin to serve as a hermeneutic tool for examining and explicating the sexual nuances that are particular to Black lesbian writing. The articulation of multiplicity's importance lies in its ability to locate intersectional identities that may have otherwise been overlooked, jettisoned, or devalued. This understanding is typified in Audre Lorde and Cheryl Clarke's poetry and prose written in the 1970s and 1980s. In using the articulation of multiplicity as a methodology and hermeneutic tool, I have attempted to think through ways we can understand the vastness of the experimental forms<sup>4</sup> of writing that Black lesbians employ in their respective works.

There is a distance between poetry and theory, and an assumption that poetry itself cannot operate as a theoretical framework. There is also a western assumption that women of color are inept in terms of

being producers of knowledge<sup>5</sup>. Using Clarke and Lorde as my main subjects, I seek to challenge those perceptions about our work. In doing so, I have created a methodology and hermeneutic tool that allows us to see how Black lesbians have demonstrated their knowledge in their work, allowing for new conversations to be had and new ideas to be birthed. In the realm of sexual politics, Lorde and Clarke, among many others, have proven that they have always been at the vanguard of creating space for lesbians through their self-definitive written and verbal proclamations.

My future work will consist of mapping out a genealogy of Black lesbian poets and using the methodology I have coined to demonstrate specific ways Black lesbian poets have contributed to literary and social movements. Thus far, I have recently conducted archival research on Angelina Weld Grimke, the first Black Lesbian poet, who I argue is the impetus for Black lesbian writers that publish after the 1920s. The methodology has been helpful in explicating her work because her same-sex desire is covertly inserted into her poetry. One of my goals is to illuminate how Black lesbian poets have contributed to literary movements like Queer theory (which arose after post-structuralism); however, our work is largely marginalized in that particular field. I am creating the genealogy to prove how we have specifically contributed.

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<sup>1</sup>Coalition building among feminist groups, i.e. white feminists, women of color feminists, and that includes transnational feminists. On a microcosmic level, coalition building as described by Lorde and Clarke means to build relationships with folks in your personal and professional communities, grassroots organizations, etc. Macrocosmically, coalition building with transnational feminists, activists, communities. Moreover, the foundation of coalition building is eradicating dominant forces like whiteness and heteropatriarchy—forces that champion division, denounce folks who are not cis-het, middle class, white, able bodied, etc. Instead, coalition building as Black Feminists describe it is the conjoining of multiple peoples, collectively

working towards liberation.

<sup>2</sup>When using the word “difference,” I intend for it to function as an integration of all parts of who a person is; the many ingredients of identity. In *Sister Outsider*, Lorde writes that there is “power from particular sources of my living to flow back and forth freely through all my different selves, without restrictions of eternally imposed definition. Only then can I bring myself and my energies as a whole to the service of those struggles which I embrace as part of my living” (Lorde 121).

<sup>3</sup>By plural, I mean a self that is, “characterized by multiplicity, plurality, ambiguity, and contradiction...we can think of these selves as not experiencing themselves moving from one identity to another truer identity but having various experiences ranging from not identifying at all, to identifying with multiple identities, to experiencing glimpses of past identifications while holding on to present identification, identifying with salient identity in particular worlds, and so on” (Ortega 181).

<sup>4</sup>I use “experimental form” to denote the type of writing that encapsulates poetics. The form is experimental because of its genre (prose, poetry), and because of its content. Both Lorde and Clarke have created politics around their identities as Black, Lesbian, Radical, Feminists, and these different selves inform how they write and what they write. The form itself is innovative, and that also makes it experimental.

<sup>5</sup>Dotson, Kristie. “Conceptualizing Epistemic Oppression.” *Social Epistemology*, vol. 28, no.2, 2014, pp. 115-138.

# **Father's Presence in Maternal Spaces: Racial, Gender-Based and Other Socialization Messages to College Women of Color**

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**Keywords:** ethno-gendered socialization, college women of color, father's presence

## **Introduction**

Fathers of color continue to have critical influence on the adult lives of their daughters. The current literature on college women and their father's focuses largely on outcomes associated with the father absence paradigm (Rostad, Silverman, McDonald, 2014). The gendered spaces and complexities of influential messages that fathers and father figures have on college-aged daughters is underdeveloped in both contexts of paternal absence and paternal presence. Racial socialization is a foci of African American child-rearing patterns, often incorporating dialogue on navigating the experiences of racism/sexism, often in the form of survival methods. Parents may modify these messages based on their child's characteristics (e.g., age and gender) (Hughes et al., 2006). This qualitative phenomenological study investigated the nature of paternal socialization messages to self-identified African American and Latina college women arising in mothering spaces, focusing on racialized gender-based themes.

## **Methods and Analysis**

Six focus groups (3 African American and 3 Latina) were conducted with a total of 21 college women. The focus group protocol asked a series of questions about maternal racial-ethnic socialization and ethno-gendered messages, and how these messages contributed to participants' ability to negotiate race and gender in the context of campus life and academic success. Guided by phenomenological analysis, differential patterns of father's influences in the lives of these college women emerged. That is, participants described father's racial-ethnic socialization and ethno-gendered messages when asked about maternal messages. Open, axial, and selective coding were used to analyze the focus group data (Creswell, 2013; Strauss & Corbin, 1998). Two primary coders analyzed the data. Two additional coders reviewed the analyses to help to finalize the codes and interpretation of the categories.

## **Results**

Four main themes emerged: intimate relationships, gender socialization, racial/ethnic socialization, and value of education. It is important to note that prior to discussing paternal socialization messages, some participants described a theme of father loss.

Theme	Definition	Example Quote
Intimate Relationships:	Development and maintenance of intimate partner and platonic relationships	<i>"[L]ike my dad just didn't like my sister dating someone out of our culture. Like it wasn't just, it wasn't right... and he will always say that.... like and it was just like he just wanted her to find someone in our culture."</i> (L)
Gender Socialization:	How a woman should behave and what defines beauty and femininity	<i>"...like my mom, and my aunts, and not really my grandmother, but everybody more serves their husband, like um, it was just opposite as being dominate. You kind of go off of him. Like you not answer to him, like that, but you just like you serve like your husband."</i> (A)
Racial/Ethnic Socialization	Transfer of culturally based values and beliefs through lived experiences	<i>"my mother is just like...nothing is really like racial with her. It just is what it is or it's just life. My dad kind of is the one that is like your Black and you have to do [deal] with this."</i> (A)
Value of Education	Prioritization and/or value of academic success in relation to culture and gender roles	<i>"[My father was proud because] I had the guts that nobody had and I'm the one who has a learning disability, I'm the one who learned slower than my sisters, I'm the one who did all the wrong then the right."</i> (L)

Table 1. Direct quotations to support the emerging themes and coding scheme

### Broader Implications

College women of color inherently negotiate the intersections of race and gender, in addition to the complexities of other cultures (e.g., nationality, ethnicity, familial, and academic).

- Father's' presence was invoked by their daughters or interpreted to daughters by mothers; father loss was as strong a theme as the invocation of their messaging.

- Some fathers set strong boundaries around interracial dating and particularly, interracial boundaries focused on marriage.
- Fathers invoked traditional and non-traditional gender roles.
- Fathers appeared more racialized to their daughters in their proscriptions for understanding and managing racial stress.

### **Future Work**

In these paternal socialization messages, we see both gendered and progressive messages of fathers. Paternal messages varied by ethnicity and therefore can be examined more closely, to uncover culturally specific renditions of paternal presence. The racial socialization literature oversimplifies parental messaging processes as exclusively maternal or paternal. Although participants were explicitly asked about maternal socialization messages, father's voices emerged through direct communication, maternal interpretation, and in place of and/or conjunction with maternal messages. There remains little research on the more nuanced racial socialization processes especially among women. Our findings challenge the existence of a true "woman's space" among college women of color (WOC). For participants in this study, fathers' influence is clearly present even when physically absent; the power of paternal messages for college WOC remains though neutralized or bolstered through maternal intervention.

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# **An association between several bacterial species and Diabetes mellitus**

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**Keywords:** urinary tract infections, *E. coli*, women, diabetes

Urinary tract infections (UTIs), which include infections of the bladder (cystitis) and kidney (pyelonephritis), primarily affect women and are responsible for nearly 13 million annual office visits in the United States. One-third of women will experience a recurrent infection within 3 to 6 months of the initial episode, and 44% will experience a recurrence within 1 year. These infections are most commonly caused by the gram-negative bacterium *Escherichia coli*, which is responsible for 80 to 85% of community-acquired UTIs; however, there are numerous other pathogens capable of infecting the urinary tract. Here, we review *E. coli* and its association with UTI.

There have been several incidents reported in the literature that there is a higher case of UTI in diabetics compared to non-diabetics (Aswani et al., 2014). Under natural conditions, the human urinary tract is able to fight against microbial infections (Rama et al., 2005), while having diabetes can make one susceptible to many types of infections, including UTI. Focusing on different bacterial species that manifest in diabetic patients that cause UTI is of primary focus for many researchers. Kidneys process about 200 quarts of blood to sift out about 2 quarts of waste products and extra water. The wastes and extra water become urine, which flows to the bladder through tubes called ureters. The bladder stores urine until releasing it through urination. However, in diabetic individuals, the structure and function of the bladder modify in such a way that it holds the waste in the bladder making room for numerous bacterial species to grow. Diabetics are more likely to have asymptomatic and symptomatic bacteriuria. Asymptomatic bacteriuria increases the risk of developing symptomatic UTI; 8% of women with asymptomatic bacteriuria develop a symptomatic UTI within 1 week (Sheerin 2011).

Generally, urinary tract infections are more so common in diabetic women than diabetic men (Nitzan et al., 2015); this has led scientists to many concerns and questions. For example, did antibiotic resistance evolve from the differences in the virulence mechanisms of bacterial species?

UTI-associated bacterial communities is a serious issue for the diabetic population (Chiu et al., 2016). These complications are more severe with poorly malformed kidneys and are more difficult to treat. This warrants further investigation of the different virulence mechanism present across distinctive bacterial species.

## **Broader Implications/Future Directions**

This research is important because urinary tract infections are one of the most common infections to humans. The article “Streptozocin-Induced Diabetic Mouse Model of Urinary Tract Infection”, (Rosen et al., 2008) illustrates that UTI is the most common site of infection in the diabetic host. Their research team described results showing that diabetic mice have increased susceptibility to uropathogenic *E. coli* infection and higher bacterial burden than non-diabetics, which suggests that having diabetes increases one chance of developing UTI.

Uncomplicated symptomatic acute cystitis and/or urethritis are usually treated for three days with trimethoprim-sulfamethoxazole (TMP-SMX), norfloxacin, or ciprofloxacin. In addition to a higher risk of developing UTI, diabetic women have an increased risk of developing complications related to UTI, such as emphysematous cystitis, abscess formation, and renal papillary necrosis (Rosen 2008). Knowing the exact mechanism is of great importance because it will lead to a better understanding of therapeutic and antibiotic treatment (Chiu et al., 2016). This knowledge will have an important impact on infection risk assessment for women and better means of therapeutic intervention to improve quality of life by promoting a means to prevent and treat UTIs.

# Principal Code-Switching: How the Manufacturing of Capital Benefits Marginalized Students

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**Keywords:** science education, elementary science, principals

## Statement of Purpose

Science is minimally taught in elementary schools due to administrative responses to federal policies, resulting in the directing of content related resources to math and reading/language arts (Blank, 2013). As funding for public education continually declines, school leaders and administrators are positioned to make the most cost-effective decisions that must now include science in many contexts. This study aims to examine how one principal draws from her cultural capital to meet the science needs of her students in an urban school district. By drawing on her cultural capital, this principal hopes to create what Langston Hughes describes as an America where “opportunity is real” for her students. The study participant described her ability to “code-switch” given her specific cultural background and K-12 experiences, which then allows her to capitalize on navigating policies to best meet the needs of her students. This study examines how one elementary principal utilizes code-switching as a source of capital to meet the needs of her students in an urban school district.

## Theoretical Framework

### Code-Switching and Cultural Capital

Cultural capital refers to the assets (practices and dispositions) gained to enhance social mobility (Bourdieu, 2003). Schools provide differing effects for children based on their social class. These varying effects are due to schools often reinforcing societal norms, and therefore social hierarchies and inequalities. Cultural capital is often viewed as an advantage for those of the dominant culture. Code-switching has been described in literature on bilingualism as well as the use of Standard English and ones’ language/dialect used at home in both formal and informal settings (Auer, 2013).

### Social Capital

According to James Coleman’s (1988) theory, social capital is a property of the relationships that people have with one another within a social system. The theory of social capital illuminates that the connections one possesses is also related to one’s access to resources. Therefore, depending on who is in the principal’s network then impacts the information a principal receives as well as their access to resources. These network connects then indirectly impact decisions and negotiations made by the school principal.

## Methods

This study employs a case study design (Yin, 2009) to gain an in-depth understanding of how a principal’s cultural capital is utilized to make decisions and negotiations to enhance meeting the science needs of students in an urban school district. Primary data sources include: (1) two semi-structured interviews with the case study principal, (2) field notes of observations from ten school days, (3) documents and artifacts. This study focuses on events identified by the case study principal, and the various considerations raised when making a decision concerning science. I axially code the data and work to unearth how cultural capital as code-switching was used strategically to enhance the

engagements within the principal's science social network--who the principal sought about science content, instruction, and/or resources.

### **The participant**

Principal Loper is an elementary principal at Leonhard Elementary in Great Lakes Schools. She has served in education for over twenty years, fifteen years as a principal and ten years in Great Lakes Schools. This data draws from a larger study which found Principal Loper to have the largest science social network among five principals within her district, naming 25 individuals as people she seeks about science content, instruction, and/or resources. Given her desire to seek individuals from the school, the district central office, and those from affiliated organizations, her leadership style was characterized as a community leader.

### **Preliminary Findings**

Code-switching was found to provide the principal in this study a strategic means to leverage the needs of her students. Two of the relevant themes that emerged from the data are now discussed. First, a principal's K-12 schooling experiences impacts their vision for schooling. The principal described that going to a White school enabled her to navigate a White dominated field, but that she also has the capacity to sit with parents and empathize with their struggle and day-to-day lives given she was raised in the same community as the parents. Next, Ms. Loper learned the needed language to strategically negotiate on behalf of students with central office staff, other principals, or with any other administrator or person involved in school/district decision-making. Mrs. Loper learned that in order to be most effective in her role as principal, she would need to learn the jargon to get what she needed for students. One example is when science resources were requested by the principal to the representative that supports the district on financial decisions. The principal specifically referenced using Title I funding and a rationale was provided. When asked how the principal knew to seek for a paraprofessional from that line item in the budget, she responded, "...it took me three times asking." Principal Loper was found to talk to those within her network about various topics concerning science to guide her understandings and decisions on science.

### **Scholarly Significance**

School principals are gatekeepers and how they negotiate decisions matters to the students and families they serve. Not having the capacity to negotiate may mean fewer resources to the community the principal serves. In this case, science was strategically advocated for based on a skillset the principal recognizes she gained at a White school during her K-12 schooling. In this case the principal utilizes the assets from her own familial upbringing as well as her familiarity with "the game". This case demonstrates that the moves principals make are strategic and principals in urban settings may need a skillset that is not learned in leadership coursework, but is rather learned through "church", or "in the neighborhood" of one's students.

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# Relationships of Ambivalence: NGOs and the State in Guatemala

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**Keywords:** NGOs, state, Guatemala

## Introduction

Since signing the Peace Accords and ending a thirty-six-year civil war in 1996, Guatemala's non-governmental organization (NGO) sector has flourished. Post-civil war Guatemala saw dramatic political economic changes including the adoption of structural adjustment programs and subsequent decentralization of civil services such as healthcare, education, and social security (Hawkins 2007; Maupin 2015). As a result of such neoliberal political economic shifts, NGOs began to fill these gaps in the civil service sector, sparking the NGO boom throughout the country. Also contributing to this boom was the financial support of NGOs by the Guatemalan government through the crafting of contractual and collaborative relationships. The most long-standing contract program was the Coverage Extension Plan (PEC), a healthcare plan from 1998 to 2015, which contracted NGOs as healthcare providers throughout the country (Maupin 2009). In a country of nearly 16.5 million people (World Bank 2017), the PEC extended health care to 4.3 million people, primarily indigenous Maya (Maupin 2015). As some have argued, NGO-State relationships can be both strategic and restrictive for NGOs as they simultaneously can provide financial and resource support while undermining organizational autonomy and community activism (Alvaré 2010; Maupin 2015). In this paper I explore how NGO representatives view NGO-government relationships, like the PEC, as a strategic social and economic alliance. Drawing from interviews I conducted with representatives from multiple NGOs in Guatemala, I discuss how NGO representatives may be negotiating relationships of ambivalence with state institutions.

## Methods and Analysis

To explore how NGOs may view NGO-State relationships strategically, I conducted preliminary interviews with nine representatives from six different NGOs in Guatemala. Four of these NGOs were former PEC-contracted NGOs and the remainder were not, but all had experience working in the healthcare sector. Participants included directors, program managers, and NGO board of director members. Interviews were conducted in English and Spanish, lasted 1 to 2 hours, and took place in participants' offices or in public spaces including coffee shops and restaurants. Interview questions focused on NGO experiences working with the state, Ministry of Health, or local municipal government. Interviews were audio recorded, transcribed, summarized, and coded using Microsoft Word and Excel for emerging themes. I created overarching thematic codes with nested schemes of sub-codes to capture the topics and themes that emerged from participant responses.

## Findings

I found that "ambivalence" was a dominant theme across discussions of NGO-state relationships. Participants exhibited mixed, often contradictory opinions about working with state and local governments. The participants from non-former PEC NGOs held negative and stigmatizing views about the PEC and contractual relationships with the government, calling NGOs who participated "arms of government" and "corrupt." However, these participants also framed nonfinancial collaborative relationships with the state, Ministry of Health, or local governments as advantageous and strategic. In these collaborations, state institutions provided other resources in place of funding such as equipment,

use of facilities, or medical referrals. On the other hand, representatives from former PEC-contracted NGOs framed the relationship with the state as a strategic, worthwhile alliance. They described the benefit of financial support, and usefulness of medical equipment and biomedical training. However, they expressed ambivalence around these relationships through additional discussions with experiences of government oversight, administrative burdens, diminishing autonomy, and the need to dispel social representations of NGO corruption.

These preliminary findings indicate that NGOs may demonstrate ambivalence toward NGO-state relationships. NGOs may be balancing strategic and advantageous factors alongside troubled representations of NGO autonomy when making decisions about working with the state. Focusing on the nature of NGO ambivalence may be a site for closely examining and understanding NGO-state associations.

### **Future Work and Broader Implications**

My future dissertation research focuses on the complexities of the relationship between the state and NGOs. I will explore issues of organizational representation and the formation of institutional identity, of which representations of ambivalence is likely only one aspect. My preliminary findings, while not generalizable, may indicate similar NGO organizational experiences as more NGOs worldwide negotiate relationships with their government institutions. Since the 1990s, NGOs, not only in Guatemala but across the world, have become a dominant sector for the delivery of civil services, human rights advocacy, community participation, and social and political change (Kamat 2004). As collaborative and contractual relationships between state governments and the growing global NGO sector become more common worldwide, it is important to understand the impact these relationships have on a sector that has become the face of development and social representation.

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# Paint Me Like I Am: Multiple Stigmatized Identities & A Culturally Sustaining Leadership

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**Keywords:** school leadership, race, leadership for social justice, culturally responsive teaching, culturally responsive school leadership, culturally sustaining

**Research Question:** How does the culturally sustaining school leadership framework account for students who enter the classroom with multiple stigmatized identities?

Culturally responsive school leadership (CRSL) has become increasingly relevant as school leaders seek to foster schooling environments that attune to the needs of students from various cultural and linguistic backgrounds and as school leaders move toward a pursuit of educational equity in K-12 schools. The genesis of the term, culturally responsive school leadership builds from the work of both Gloria Ladson-Billings, who termed culturally relevant pedagogy (CRP) and Geneva Gay who termed culturally responsive teaching (CRT). This body of literature has continued to evolve as scholars have sought to remake and reshape these foundational pedagogies (Ladson-Billings, 2014) into what Paris (2012) has adopted as a culturally sustaining pedagogy (CSP). CSP seeks to perpetuate, foster and sustain the languages, literacies, and cultural ways of being of students of color.

In addressing the foundations of how CSP and CRP operationalize in school leadership, I move toward the term, culturally sustaining school leadership (CSSL). Further, I take into account the multiple stigmatized and sometimes fluid identities that accompany students of color in the classroom. As previously referenced, Gay posits that while culturally responsive teaching is important, it alone cannot solve the major challenges facing minoritized students (Gay, 2010) or as I see it, students who are faced with multiple oppressions in the process of schooling based off of the overlapping of multiple stigmatized identities. Certainly, this requires a school leadership that seeks to perpetuate, sustain and foster the multiple languages, literacies and identities of students.

At the crux of Paris' notion of culturally sustaining pedagogy is the question, "how are students leaving whole?" If teacher leaders and school leaders are to consider the fullness of students that occupy our classrooms, there must be a school leadership in place that presents their teachers and staff with the same question. These educational leaders have past, recent or current experiences that associate the attainment of education with a viable means of breaking cycles of poverty, exclusion, and marginalization (Santamaría & Santamaría, 2016). My dissertation topic will examine how students with multiple stigmatized identities fit into the culturally sustaining model of leadership. In particular, I seek to examine leader perception of CSSL and how that influences the overall school and classroom climate while also centering (a) youth voice, (b) youth perceptions of CSSL and (c) the sustenance of their identities.

I anticipate that this study will be conducted in a K-6 school setting that serves a student population that is culturally and linguistically diverse. More specifically, my intended methods are ethnographic in nature, focusing on student perceptions of CSSL.



In the context of this study, I will examine how youth of color in a public Southwest Detroit High School, that self identify as having multiple stigmatized identities, conceptualize CSSL. Given the focus on race, gender, and sexuality, a critical qualitative analysis is an ideal methodology for this study. Through conducting individual interviews, I will be able to center youth voices and identify the implications of CSSL for K-12 school leaders.

### **Future Work**

I envision this work traversing beyond the academy and serving as an accessible literature for school leaders who seek to foster equity oriented schooling environments that take into account the complex personhood of each student that enters their building. Moving toward a school leadership that seeks to sustain these multiple identities of students allows for a more whole (Paris, 2012) experience for students of color in K-12 education.

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# Perspectives of Restorative Practices in an Urban School

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**Keywords:** restorative practices, education

## Purpose

There has been expansive research showing that suspensions from school do not quell misconduct (McNeal & Dunbar, 2010) and that they occur at disproportionately higher rates for students of color, yet schools still employ exclusionary practices as a means of discipline (Goodkind et. al., 2008; Skiba, 2000). These suspensions negatively impact students both academically and socially, depriving them of classroom instruction and ostracizing them from the school community (Waters-Maze, 2002). One alternative to the aforementioned tactics is restorative practices, during which, both individuals that are harmed and those that have caused harm work together to identify the effects of their actions and ways to work toward reparation and rehabilitation (Van Ness & Strong, 2015). A number of schools seeking to curb school suspension and improve school culture have made restorative practices a priority.

As restorative practices have recently migrated from the criminal justice system to schools' discipline policies, there are few empirical studies of how it is applied in schools, and even fewer studies focusing on its application in urban schools. Therefore, it is imperative that restorative practices are further researched in order to ensure that they are a viable option for helping schools to protect students from the harmful effects of exclusionary practices. Studying these practices from the perspectives of school staff allowed for a better understanding of how policies that guide elements of school community come to fruition and how they are sustained. My research questions for this study are:

1. What are administrators' perspectives of and expectations for restorative practices within an urban school?
2. How are policies and expectations for restorative practices conveyed by school administrators and received by teaching staff?

## Methods

To answer my research questions, I conducted a case study of a charter school in a large Midwestern city. This school serves nearly 800 students in grades six through twelve and is currently in its fourth year of using restorative practices. As part of the case study, I examined literature that the school uses to guide their restorative practices and observed professional development in order to understand how restorative practices were described and discussed amongst school staff. I also conducted structured interviews with school administrators and several teachers. In an attempt to obtain a variety of perspectives, I spoke with school staff members that were able to compare restorative practices to the school's previous policies, as well as those that were only versed in restorative practices.

## Findings

As the program is fairly new to the school, teachers and administrators are still working to implement restorative practices with fidelity. Teachers have suggested that more support would be beneficial in doing so. Though members of the school's staff participate in training for the program at the beginning of each school year and discuss its progress throughout the year during professional development, both

teachers and administrators have noted the immense effort required in making a shift toward restorative practices. Instead of an alternative discipline program, restorative practices have been described as a mindset that emphasizes the importance of relationships. While restorative practices have not replaced the school's code of conduct, they have been used as proactive measures to build trust and rapport within classrooms and as interventions for some disciplinary incidents. Though many view restorative practices solely as methods that allow for students and staff to address harm, the goal of administrators is that the school policies move toward adopting more of the aforementioned proactive measures.

### **Limitations**

This study only focused on the implementation of restorative practices from the perspectives of teachers and administrators. For future work, it will be important to work with students from the school to learn their perspectives about the program. This could offer implications for school administration as they seek to ensure that the program is implemented with fidelity, which is another aspect of the program that was not analyzed. Also, examination of school data, including suspension rates and behavior referrals would be beneficial in understanding the effects of restorative practices on the school's culture.

### **Significance**

Examining the effects of restorative practices at an urban high school highlights alternatives that may be used in order to build school community and subsequently decrease exclusionary discipline practices. This could have positive implications for students of color, who are suspended at disproportionately higher rates and are more susceptible to the ramifications of the school to prison nexus. This study also serves as a barometer for how educators view the program as it is implemented. Knowing the experiences and perspectives of those involved in restorative practices can help institutions improve their own procedures, or encourage other schools to begin to adopt similar methods.

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# Strategic Entry: The Role of Candidate Training Program in the Decision to Run

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## Introduction

While the scholarship indicates some groups of people are more likely than others to express political ambition, it also suggests that challengers (non-incumbent political candidates) strategically enter the electoral arena. The traditional conception of political ambition suggests that there is an eligibility pool for office (Fowler 1993) and potential candidates for elected office emerge based on strategic decision making (Jacobson and Kernell 1983).

Taken all together, if office seekers are rational and strategically determine when and where they enter the electoral arena, then the question remains where do candidates receive their information and learn the rules of the electoral game. For incumbents, the answer to the question posed is relatively easy. Political insiders have access to information and resources that the average challenger does not. However, for challengers, the question posed is more complex, especially as it pertains to female candidates.

I focus on the role of candidate training programs in the state electoral process. These programs are focused on the training and recruitment of potential candidates for office. I pay particular attention to how they positively influence the candidacy and election of female state legislators and city level executives.

## Methods

I use a linear regression model to examine whether former participants in candidate training programs are more likely to be strategic in their entry into the electoral arena. For instance, quality, potential candidates are less likely to enter an electoral race when an incumbent runs for office, but are more likely to do so in the absence of an incumbent (Bond, Covington, and Fleisher 1985; Cannon 1990; Jacobson 2001) or when they perceive that they are likely to win (Maisel & Stone 1997). I use data from the CAWP Recruitment Study as it focuses on individual level factors and choices of current legislators and city level executives. The main independent variable is a dichotomous measure of whether or not the survey respondent participated in a candidate-training program. I control for factors such as gender, party identification, race (white or nonwhite) and education.

The central piece in answering the question I pose is defining strategic behavior. The dependent variable is an additive index including measures of strategic legislative behavior as defined by the literature. The variables included in the index are measures of factors that played a role in the survey respondent entering the electoral race for his or her current legislative position. These factors include the presence of an open seat election, having the financial resources to run for office, the role of party support in the decision to run, and the use of the office as a stepping-stone to higher office. I rescale the new measure such that the highest value included in the index is a 10 and the lowest value is a 0. Because of the way in which the variables were originally coded, lower values are indicative of being more strategic.

## **Analysis and Results**

In the model, party identification is not significant nor is the gender variable. The fact that these two variables are not significant indicate that individuals, regardless of party identification or gender, engage in strategic behavior in order to win political office. Similarly, race and education are also non-significant. What is important for strategic behavior is candidate training program attendance. However, because the model in its entirety is not significant, it would not be wise to interpret what the significant association between candidate training programs and strategic behavior means within the model. The non-significance of the model, in its entirety, might suggest that there is multicollinearity between the independent variables and an alternative modeling approach may be necessary to best understand the relationship between strategic behavior and candidate training program attendance.

## **Future Work**

In future iterations of this analysis, better model specification is needed to address model significance as well as other factors that might play a role in the strategic behavior of individuals seeking office. Beyond candidate training program attendance being a factor in strategic behavior, one's relationship with the party or one's financial resources might also be an indicator of strategic behavior.

## **Broader Implications**

At the heart of this study is a focus on how to support more women in seeking public office. Women continue to be underrepresented at all levels of office. Women's presence in political spaces are important because they tend to champion issues that men do not and are often considered more effective legislators than their male counterparts (Anzia and Berry 2011). Although model significance is an issue here, it is encouraging that the only variable that was significantly associated with strategic behavior is candidate training program participation. Further examination of candidate training program participants might also prove useful in better understanding the paths to candidacy for women and minorities. Additionally, since many candidate-training programs target women and minorities in particular for public office, the success rate of these programs might speak to where these candidates in particular emerge and for which offices they choose to run.

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