The Penn State McNair Journal

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THE PENN STATE MCNAIR JOURNAL – SUMMER 2018, Vol. 23

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Research Articles

About the Penn State McNair Journal

The twenty-third issue of the *Penn State McNair Journal* presents the findings of undergraduate research conducted by Penn State McNair Scholars during the 2018 McNair Summer Research Program. All research was conducted under the supervision of Penn State faculty who served and volunteered as Faculty Research Advisers. The hard work and persistence required in producing new knowledge through research is evident in these articles. Since 1991, the Penn State McNair Scholars Program has enhanced the lives of students. McNair is a valued diversity and inclusion program which provides educational access and opportunity for program eligible students who express a strong desire to continue to graduate education upon achieving their baccalaureate degrees in pursuit of achieving a doctoral degree. The professional staff of the Penn State McNair Scholars Program thank the following university officials for their ongoing support of the program:

Curtis B. Price, M.Ed.
Program Director
The Pennsylvania State University Ronald E. McNair Scholars Program

TRIO Programs at the National Level

TRIO is a set of federally-funded college opportunity programs that motivate and support students from disadvantaged backgrounds in their pursuit of a college degree. More than 800,000 low-income, first-generation students and students with disabilities — from sixth grade through college graduation — are served by over 3,100 programs nationally. TRIO programs provide academic tutoring, personal counseling, mentoring, financial guidance, and other supports necessary for educational access and retention. TRIO programs provide direct support services for students, and relevant training for directors and staff.

The Higher Education Amendments of 1972 added the fourth program to the TRIO group by authorizing the Educational Opportunity Centers. Amendments in 1986 added the sixth program, the Ronald E. McNair Post-Baccalaureate Achievement Program. Additionally, in 1990, the Department created the Upward Bound Math/Science program to address the need for specific instruction in the fields of math and science.

The TRIO programs were the first national college access and retention programs to address the serious social and cultural barriers to education in America. (Previously only college financing had been on policymakers' radar.) TRIO began as part of President Lyndon B. Johnson's War on Poverty. The Educational Opportunity Act of 1964 established an experimental program known as Upward Bound. Then, in 1965, the Higher Education Act created Talent Search. Finally, another program, Special Services for Disadvantaged Students (later known as Student Support Services), was launched in 1968. Together, this "trio" of federally-funded programs encouraged access to higher education for low-income students.

By 1998, the TRIO programs had become a vital pipeline to opportunity, serving traditional students, displaced workers, and veterans. The original three programs had grown to nine, adding Educational Opportunity Centers and Veterans Upward Bound in 1972, Training Program for Federal TRIO programs in 1976, the Ronald E. McNair Post-baccalaureate Achievement Program in 1986, Upward Bound Math/Science in 1990, and the TRIO Dissemination Partnership in 1998.

As mandated by Congress, two-thirds of the students served must come from families with incomes at 150% or less of the federal poverty level and in which neither parent graduated from college. More than 3,100 TRIO projects currently serve close to 800,000 low-income Americans. Many programs serve students in grades six through 12. Thirty-five percent of TRIO students are Whites, 35% are African-Americans, 19% are Hispanics, 4% are Native Americans, 3% are Asian-Americans, and 4% are listed as "Other," including multiracial students. More than 7,000 students with disabilities and approximately 6,000 U.S. veterans are currently enrolled in the TRIO programs as well.

The Pennsylvania State University houses eight federal TRIO grant programs at the University Park and at Commonwealth campuses throughout the state. These programs include Educational Opportunity Centers (EOC), Educational Talent Search (Talent Search), Ronald E. McNair Post-Baccalaureate Achievement Program, Student Support Services (SSS), Upward Bound, Upward Bound Math and Science.

McNair Scholars Program at Penn State

The Pennsylvania State University Ronald E. McNair Scholars Program is a comprehensive academic year program, with an eight-week intensive summer research program component designed to prepare undergraduate students who are low-income and first generation, and/or underrepresented in graduate education for graduate school so that they can earn their Ph.D. The program also provides services and opportunities to produce competitive graduate school applicants who have the skills and experiences necessary to successfully earn a Ph.D.

Penn State McNair scholars have been accepted to, are currently enrolled in, or have graduated the following institutions across the nation: Harvard University, University of Pennsylvania, Yale University, University of Maryland-College Park, University of Illinois-Urbana Champaign, Pennsylvania State University, University of New Mexico, University of Texas at Austin, and University of Chicago.

Since 1991, the Penn State McNair Scholars Program has assisted more than 300 students with earning their baccalaureate degrees and preparing them for success in graduate education. Currently more than 50 Penn State McNair alumni have earned their Ph.D.

Penn State McNair alumni work in many areas of the public and private sector including: academia, research, administration, public policy, and the health sciences.

2018 Penn State McNair Summer Research Program Scholars, Office of Graduate Educational Equity, and Penn State McNair Professional Staffs

About Ronald E. McNair

"Whether or not you reach your goals in life depends entirely on how well you prepare for them and how badly you want them." -Ronald E. McNair

Ronald Erwin McNair was born on October 21, 1950, in Lake City, South Carolina. McNair displayed an early aptitude for technical matters, earning the nickname "Gizmo." His interest in space was piqued by the launch of the Russian satellite Sputnik in 1957, and boosted by the appearance of *Star Trek* on TV years later, its multi-ethnic cast pushing the boundaries of what was possible for a small-town African-American boy.

An outstanding student at Carver High School, McNair starred in baseball, basketball and football and played saxophone for the school band. He graduated as valedictorian of the class of 1967, earning a scholarship to attend North Carolina Agricultural and Technical State University (NC A&T). After initially considering majoring in music at NC A&T, McNair eventually came back around to his love for science, graduating magna cum laude in 1971 with a B.S. in physics.

From there, it was on to the Massachusetts Institute of Technology as a Ford Foundation fellow. Adjusting to the new environment proved a challenge for McNair. He later faced a potentially career-altering obstacle when two years of specialized laser physics research for his doctorate was stolen, but he managed to produce a second set of data in a year, and earned his Ph.D in physics in 1976. Dr. McNair was a member of several organizations during his professional career, including the American Association for the Advancement of Science, the American Physical Society and the North Carolina School of Science and Mathematics Board of Trustees. He was named a Distinguished National Scientist by the National Society of Black Professional Engineers in 1979 and received the Friend of Freedom Award 1981.

During his NASA career, McNair was assigned to the STS-51L mission in January 1985. The primary goal of the mission was to launch the second Tracking and Data Relay Satellite (TDRS-B). It also carried the Spartan Halley spacecraft, a small satellite that McNair, along with mission specialist Judith Resnik, was to release and pick up two days later using *Challenger*'s robotic arm after Spartan observed Halley's Comet during its closest approach to the Sun. Tragically, *Challenger* launched from Cape Canaveral on January 28, 1986, but the orbiter *disappeared in an explosion just 73 seconds after liftoff.* McNair and the six other astronauts in the crew did not survive. Shortly after his death, the Ronald E. McNair Post-Baccalaureate Achievement Program was created through an act of Congress.

Acknowledgements

Climate Change Effects on Invasive Plant Cover in Mid-Atlantic Wetlands

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Monioluwa Adeyemo, McNair Scholar, The Pennsylvania State University

McNair Faculty Research Adviser: Michael Nassry, Ph.D.
Assistant Research Professor
Department of Geography
College of Earth and Mineral Science
The Pennsylvania State University

Abstract

Climate change can negatively impact ecosystems and the people dependent on the services ecosystems provide. Freshwater wetlands are one example of an ecologically sensitive landscape feature, which can be impacted by changes to the magnitude and timing of precipitation and flooding events. This research investigates how climate change driven alterations to wetland hydrology impacts invasive plant species in the Mid-Atlantic Region (MAR) by identifying correlations between previously collected ecological condition assessment data from surveys spanning multiple ecoregions across the MAR. Correlations extracted from the data highlight relationships between the invasive plant species cover and indicators of wetland hydrology. Results showed different patterns of invasive plant species coverage by State and the Riverine and Isolated Depression wetland sites with most observed indicators of wet conditions had the least invasive species cover. The information gained from this project will aid in understanding the future impacts of climate change on wetlands and be used to inform land managers and policymakers.

Introduction

Climate change is frequently described as an increase in annual global temperature, however smaller-scale changes to seasonal temperature and precipitation norms can have a significant impact on ecosystems. Human actions are driving climate change by emitting carbon dioxide (CO_2) into the atmosphere, leading to many unwanted changes. These actions, including driving cars that run on gasoline, greenhouse gas emissions from factories, and use of electricity that is not generated from green energy sources lead to increasing levels of greenhouse gas (GHG) emissions, particularly CO_2, leading to a warming of the Earth's atmosphere (Pennsylvania Department of Environmental Protection, 2015). These environmental changes can include an increase or decrease in precipitation, floods, drought, ice caps melting, wildfires, and stronger storms, these changes will continue to get worse over time (Pennsylvania Department of Environmental Protection, 2015). The aforementioned consequences have a tremendous effect on the environment which is a delicate system requiring balance (Abler, Blumsack, Shortle, 2015), climate change alters that balance forcing environments to adapt or be destroyed.

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Seeing that climate change can have a major effect on the environments led us to investigate the question, how will climate change driven alterations to wetland hydrology impact invasive plant species in Mid- Atlantic wetlands? Wetlands are a unique and fragile landscape feature that requires a specific hydrology pattern which climate change is altering.

During my research I looked at ecological assessment data from wetlands adjacent to streams in agricultural landscapes in Pennsylvania (PA), Maryland (MD), Virginia (VA), and long-term study watersheds wetlands in Pennsylvania (PA), with the goal of identifying potential correlations between climate change driven hydrology patterns and wetland vegetation. By examining invasive species and hydrology in these wetlands, the hope is that it will give us more information on how wetlands will react to climate change. Invasive plant species are more prevalent in disturbed areas which are experiencing landscape or hydrology changes. The focus of my research is to determine if climate change alters wetland hydrology and how the change in that hydrology effects invasive species cover in the wetlands. This information is beneficial because it will provide insight into how potential climate change driven droughts could impact invasive vegetation species cover in wetlands. We hypothesized more invasive plants will be found at wetland sites where drier conditions are observed compared to wetland sites where wetter conditions are observed. The take away from this research is to find a correlation between hydrology conditions expected to arise from climate change and invasive plant species found in wetlands. In the future, we hope to be able to predict what might happen to other wetlands as climate change intensifies. These findings are important given the numerous ecosystem services, which include water quality improvement, flood control, and nursery areas for aquatic species. If wetland conditions continue to decline these ecosystem services will no longer be provided to our communities. That loss of function would cause us to find new, man-made ways to perform tasks which were previously done by properly functioning wetland ecosystems. In doing this research we hope to find broad or species-specific correlations, to better inform land managers and program administrators.

Methods

Our research approach was to focus on opposite ends of the observed hydrology spectrum, either extremely wet or extremely dry conditions. The first step was to construct a list of invasive plant species appearing in the ecological assessment data. This species list was then separated by state, ecological region, stream order, and wetland type. Invasive species profiles were created for invasive plants found in the assessed wetlands and included specific life cycle characteristics including bloom time, condition (e.g. hydrology, sunlight) needed to live, place of origin, seed life in soil, invasiveness, and how many seeds are produced. This data will aid in the understanding the invasiveness of the plants, what conditions are needed for them to out-compete native plant species, and if patterns or frequency of invasive plant species exists between groups of wetlands.

The next step was to assess wetland hydrology. This entailed looking at ecological assessment data from each site and quantifying indicators of wet conditions (Extreme, Moderate, Somewhat). This was done by tallying up the numbers of each indicator of hydrology individually and in severity-based groups. Tallying up these indicators helped to better understand the site hydrology. We then examined the data for the invasive species cover at each site, grouped them into categories of <5%, 5-20%, 20-50%, and >50%, and assigned number categories (<5% is Category 1, 5-20% is Category 2, 20-50% is Category 3, and >50% is Category 4).

Then, each sites' total invasive species cover was assessed and assigned a category. This process then was also applied to individual invasive species cover of each site.

We then compared and quantified the indicators of hydrology conditions at the sites to the invasive species profile and cover categories, to determine if there is a relationship between locations considered extremely wet sites and invasive species abundance. The ecoregions we considered in our study were the Appalachian Plateau, Piedmont, Ridge and Valley, and Coastal Plain. The wetland types included in our study are Riverine, Headwater Floodplain, Mineral Flat, Fringe, Depression, and Slope. This was used to determine if there are more invasive species in certain ecoregions or wetland types.

Results

We first looked at the frequency of the invasive species for each state and landscape focus area and saw all four groups have the invasive plant species multiflora rose in common. Figure 1 also indicated that streamside wetlands in PA agricultural landscapes had a higher frequency of invasive species than the PA sites from a long-term study watershed. The third finding in the profile showed that all four projects had different invasive species frequency and different invasive species.
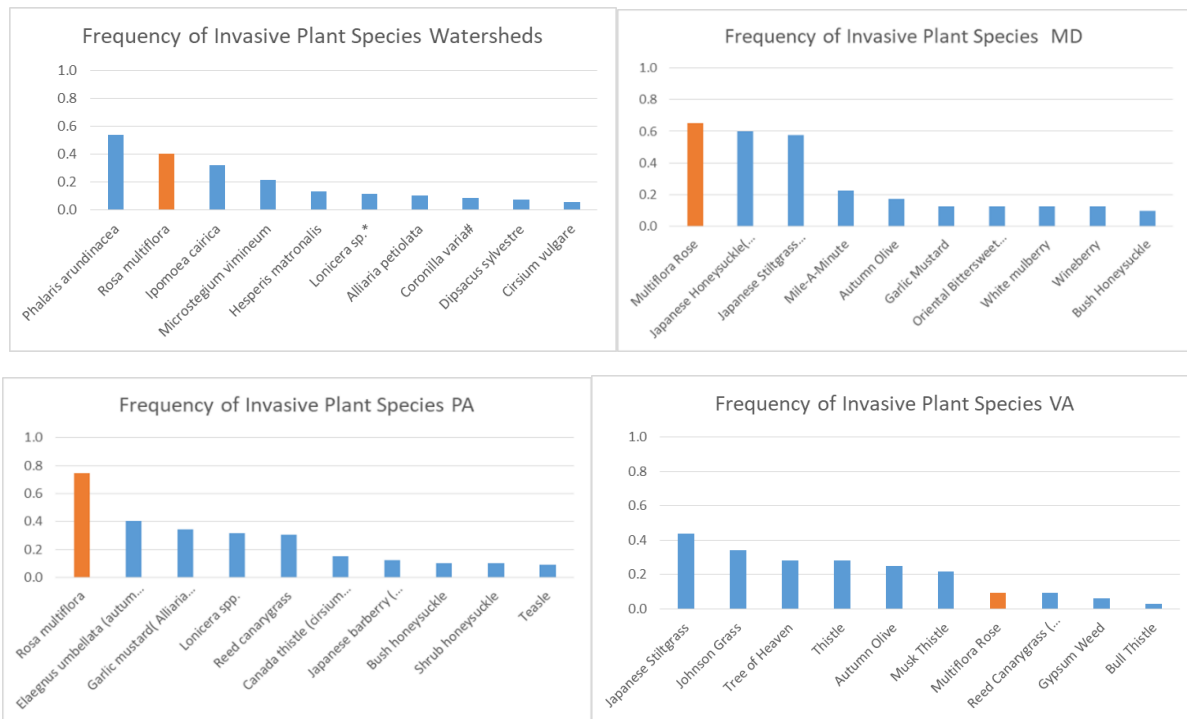
Figure 1: Frequency of invasive species for the four projects. Multiflora Rose is indicated using orange.

Key for figure 1:

Top Left Graph	Frequency of invasive plant species for long-term study Watersheds Wetlands in Pennsylvania
Top Right Graph	Frequency of invasive plant species for Wetland adjacent to streams in agricultural landscape in Maryland
Bottom Left Graph	Frequency of invasive plant species for Wetland adjacent to streams in agricultural landscape in Pennsylvania
Bottom Right Graph	Frequency of invasive plant species for Wetland adjacent to streams in agricultural landscape in Virginia

When comparing hydrology indicators across ecoregions, the Appalachian Plateau had the highest frequency of wet indicators and the Coastal Plain had the lowest frequency of wet indicators. When comparing average invasive plant species cover across ecoregions, we found that Appalachian Plateau had the lowest invasive species cover. This shows an inverse correlation between the number of observed wet indicators and average invasive plant species cover across the ecoregions in our study.
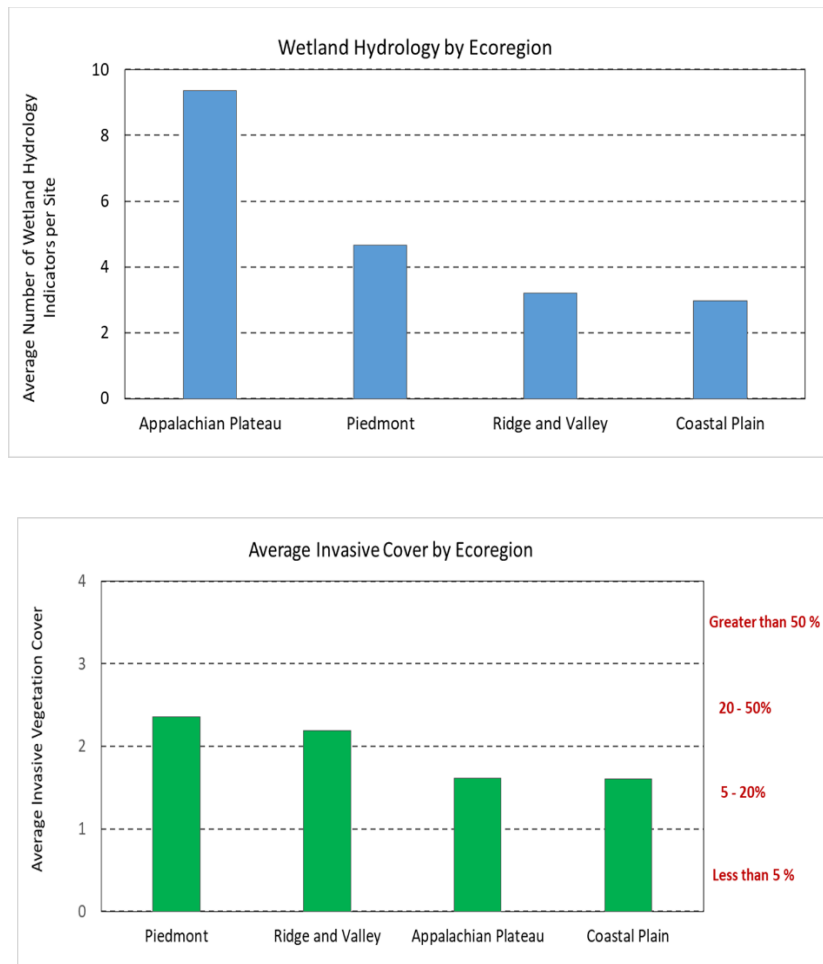
FIGURE 2: The graph on top shows the amount of wet indicators for each ecoregion. The graph on the bottom shows the invasive species cover in the category for each ecoregion.

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The results from comparing wet indicators and wetland type revealed Riverine/ Fringe wetlands have the highest amount of wet indicators and Headwater Floodplain / Depression wetlands has one of the lowest frequencies of wet indicators. When average invasive plant species cover was compared with wetland type, we found Headwater Floodplain / Depression has the highest amount of invasive species cover and Riverine/ Fringe has one of the lowest average invasive plant species cover. This shows an inverse correlation between wet indicators and average invasive plant species cover for this wetland type.
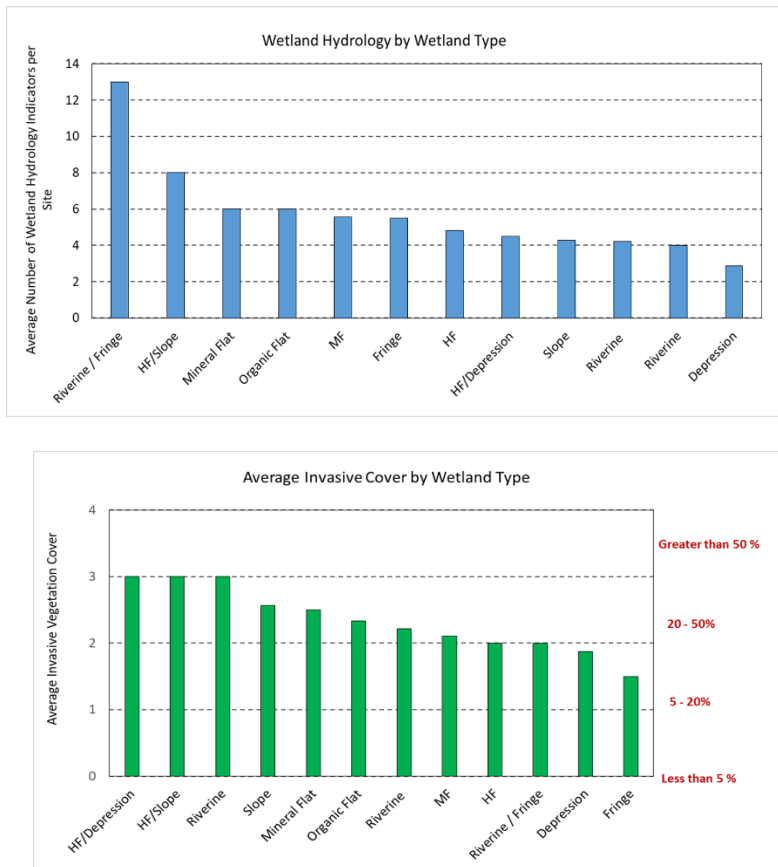
FIGURE 3: The graph on top shows the amount of wet indicators for each wetland type. The graph on the bottom shows the invasive species cover in the category for each wetland type.

The most significant finding in this research project is the link between hydrology indicators and invasive plant species cover. The results from grouping sites by state showed the differences between PA, VA, and MD were not significant. Even with the small differences, the data showed that sites with less wet indicators had 20% invasive vegetation cover and sites with more wet indicators had 10% invasive vegetation cover. When we compared wetland type by ecoregion we found that sites with the wettest conditions had 5% or less invasive cover. While sites with less wet indicators had 20% or more invasive species cover. This correlation was observed in Riverine and Isolated Depression wetlands in the Appalachian Plateau, Coastal Plain, Piedmont, and Ridge and Valley ecoregions.

Discussion

The results from the invasive plant profile indicated there is a difference in the type of invasive vegetation found in each state and landscape type. This means there will likely be a difference in how these locations respond to hydrology changes caused by climate change or new management practices in these areas. Figure 1 shows multiflora rose is a common invasive species across all study areas in the MAR and indicates region-wide attention is required. Figure 1 also indicates that constructed wetlands adjunct to agricultural streams in PA have a higher invasive species frequency then sites from more diverse locations in these long-term study watersheds. These results are significant because wetlands adjunct to agricultural streams in PA in this study were all man-made wetlands, which are normally more vulnerable to invasive plants due to the recent landscape disturbance. The analysis of hydrology indicators and average invasive plant species cover by ecoregion showed that wet indicators and average invasive plant species cover have an inverse relationship. This was also true for wetland type in comparison with wet indicators and average invasive species cover. This is most likely due to the ecoregions like Appalachian Plateau being in a less disturbed area making it less vulnerable to invasive vegetation.

Analysis comparing site hydrology to invasive cover by state did not show a strong correlation, which we can interpret as there is probably not much effect on the wetland condition caused by state management practices. For ecoregion and wetland type, the research showed a strong correlation between wet indicators and invasive plant cover, which was 5 % for sites with the most wet indicators and 20% for sites which had the least wet indicators. We can infer for the wetland types that showed this correlation (riverine and isolated depression) that if climate change results in lower groundwater levels, invasive species cover will increase.

The results of this research could have many implications going forward. It can be used to aid in future design and construction of wetlands. Additionally, knowing which areas have been more affected by invasive species, can aid in selecting more sustainable sites for constructed wetlands. These results will also influence the management of the wetlands, by letting groups which manage wetlands know which sites require frequent attention, money, and time to maintain. This will also help environmentalist in understanding how wildlife habitats will be affected by changes in wetland vegetation. If wetland function degrades dues to climate change, quality of nearby bodies of water could also be negatively affected. This could help better inform groups focused on measures to improve water quality. Lastly, the results of this research can be used to help policymakers make informed decisions for the environment and the communities surrounding these ecosystems.

Conclusion

At a broad scale, our hypothesis was not proven, however the results of this project will be beneficial as we continue to further understand how climate change is impacting specific wetland types and ecoregions. This research project has highlighted some important effects of climate change on wetland hydrology it also brought to light other factors and questions which need answers as we move forward in protecting our environment. Some additional questions which need to be considered include: How stressors impact the MAR wetland vegetation? How will wetland vegetation not in the MAR be impacted by climate change? How can management be improved in constructed wetlands? and How will extreme wet conditions impact invasive vegetation cover? Overall this project has aided in the progression of understanding how climate change will affect wetlands.

Acknowledgements

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A Qualitative Analysis of the Complex Relationship Between Fatherhood, Incarceration, and Desistance

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Chanya Anderson, McNair Scholar, The Pennsylvania State University

McNair Faculty Research Adviser: Derek Kreager, Ph.D.
Professor of Sociology and Criminology
Department of Sociology and Criminology
College of the Liberal Arts
The Pennsylvania State University

Abstract

Understanding desistance from crime and substance abuse is a critical criminological concern, particularly in the era of mass incarceration when so many formerly incarcerated individuals exit prison and return to their communities. Scholars have theorized that fatherhood should provide a 'hook for change' and motivate desistance, but research on this topic has provided equivocal results. The study draws on the narratives of returning prisoners from the Therapeutic Community Prison Inmate Networks Study (TC-PINS) to understand the role that fatherhood may have in promoting desistance. It is possible that men who prioritize their children use them as a stronger motivating force to remain drug and crime free once released. These factors, among others, are considered to understand how fatherhood intersects with reentry and aftercare planning. The current study uses a sample of 25 incarcerated fathers to analyze this complex relationship. Findings suggest that fatherhood is a primary motivation for desistance post-incarceration. However, it appears that this relationship is complicated by prior relationships with the children and the mothers of the children as well as financial responsibilities.

Introduction

The United States now has the world's largest incarcerated population and highest incarceration rate. Since the late 1970's, when the U.S first began to see a dramatic rise in prison populations, the number of people incarcerated has continually increased until a peak in 2008, with just over 2 million people in jail or prison (Carson and Anderson, 2016). The current United States incarceration rate is about 750 inmates per 100,000 residents, compared to other developed Western nations who incarcerate less than 200 inmates per 100,000 residents annually (Clear and Frost 2014). This era of mass incarceration has led to a large stream of people into the United States prison system. Conversely, it also has resulted in a large stream of people leaving prisons and jails every year. Thousands of incarcerated men and women will reenter their communities in the coming year. Since 2000, between 600,000 and 700,000 male and female prisoners have been released annually (Carson and Golinelli, 2014).

While these previously-incarcerated people are expected to reenter their communities as reformed and now-productive members of society, this is rarely the case. Formerly incarcerated people face many challenges once released, including societal stigmatization, housing and income instability, and fractured family and social ties. These challenges cause many to reoffend and be reincarcerated at alarming levels. A United States Sentencing Commission study found that, of 25,400 inmates released in 2005, nearly half (49.3%) were rearrested within the next 8 years. A third of those were reconvicted and about 25% were reincarcerated (Hunt and Dumville, 2016). High levels of recidivism by those who have been previously incarcerated has generated a great deal of research to understand the causes of recidivism and how to prevent it.

Given that many of those who are incarcerated will at some point be released (except for those serving life sentences), it is important for those in the criminology and criminal justice fields to understand the reentry process and the factors that may inhibit successful reentry. One such factor that has been strongly correlated to recidivism and crime is substance abuse. Whether the individual commits a crime to obtain money for drugs or they commit a crime while under the influence of a drug, crime and substance abuse appear to be strongly entwined. In the Liverpool Desistance Study, 90% of all participants in both groups (desisting and persisting) stated that they had regularly used drugs at some point and two thirds stated that they have been addicted to drugs or alcohol at some point in their lives (Maruna, 2000). Given that many of those who are incarcerated struggled with substance abuse prior to incarceration, simply being incarcerated is not enough to prevent them from going back to drugs after release. Therefore, substance abuse treatment during incarceration has become a necessity for many inmates. A 1991 report by the U.S General Accounting Office found that nearly 74% of inmates needed drug treatment, but only 15% were receiving it (U.S General Accounting Office, 1991).

A promising drug treatment program offered during incarceration is the Therapeutic Community (TC), which first emerged in the 1950s. While therapeutic communities aim to treat individual disorders of substance abuse, they also work to transform lifestyles and personal identities using a community approach (De Leon, 2000). In comparison to other substance abuse programs, TC's appear to be better suited for the prevention of recidivism after release. A 1990 study comparing the Stay'n Out TC to two other forms of treatment (Milieu and counseling) and inmates receiving no treatment found evidence that the prison-based TC program significantly reduced recidivism in both males and females (Wexler, Falkin & Lipton, 1990). Three of the most essential parts of the TC program are 1) the focus in a change of identity for the participants, 2) continual treatment post-release called aftercare, and 3) a focus on interpersonal relationships.

A commonality found in the participants of TC's are that they have "negative social identities and unformed personal identities." They perceive themselves in ways that often stem from their drug abuse. Thus, they internalize negative stigmatizations that have been placed on them by society such as "addict" or "criminal" (De Leon, 2000). TC's help the inmates form new, positive identities based around their feelings, thoughts, and goals. These new identities can provide a catalyst for change. Using this new identity, the inmate can foresee a future that is not riddled with crime and substance abuse but rather an achievable goal of who they hope to become.

Aftercare for inmates can take the form of Narcotics Anonymous (NA), Alcoholics Anonymous (AA), dual diagnosis groups, transition or halfway houses, and many others. For some inmates, these programs are a stipulation of their parole while for others these programs are voluntary. Aftercare is an essential part of the process for those with substance abuse because it allows the progress made in TC to continue upon their reentry. Once back into society, there are an abundance of stressors that may drive the individual back to substance abuse. Aftercare is a way to help the individual confront and deal with these stressors without turning to substance use. It also provides a support system of peers and counselors who understand the individuals' circumstances and want to see them succeed. For many, being left in the community without this support will often lead back to substance use, even if not right away, and inevitably recidivism (De Leon, 2000).

An identity change that may also facilitate effective aftercare can come in the form of parenthood. Parenthood can be a turning point, or "hook for change," that causes inmates to desist from substance abuse and crime for the sake of their children (Giordano, Seffrin, Manning & Longmore, 2011). Interpersonal relationships are at the core of the "community approach" of therapeutic communities. The therapeutic community emphasizes that post-release, positive interpersonal relationships, such as family, should facilitate recovery (De Leon, 2000). However, most literature that focuses on parenthood and re-entry focuses on motherhood, with much less focus being placed on fathers (Barnes and Stringer, 2012; Bachman, Kerrison, Paternoster, Smith & O'Connell, 2016; Michalsen, 2011). Those studies that do analyze the impacts of fatherhood on criminal desistance tend to find null or weak effects (Wolfgang, Thornberry & Figlio, 1987; Farrington and West, 1995; Massogoali and Uggen, 2007). This lack of research and equivocal findings open a need to understand the variable role that fatherhood may play in the re-entry process, specifically for those with substance abuse issues, participating in prison-based programming, and preparing to re-enter their communities.

The current study focuses on a sample of currently incarcerated men with various substance abuse disorders and looks to understand how parenthood intersects with their re-entry and aftercare planning. At the time of their first interview, the men were incarcerated within a Pennsylvania medium security prison and set to be released soon. To understand how fatherhood fits into the men's re-entry planning, respondents who were fathers were first separated from the non-fathers, with 25 fathers forming the primary sample. The goal is to analyze 1) What type of man is more likely to look to their children as motivation to desist and 2) Why do some fathers prioritize their children and use them as motivation for desistance, while others do not? I hypothesize that factors such as socioeconomic status, relationship with the child, and relationship with the child's mother, among others, will help to explain the answers to these questions. To test these hypotheses, I will qualitatively code and present narratives drawn directly from the incarcerated men.

Data

This study is based on data collected during a larger project titled the Therapeutic Community Prison Inmate Networks Study (TC-PINS) that focuses on peer processes in a men's prison substance abuse treatment program. The TC-PINS project utilizes a longitudinal network study that occurred in a TC program and continued during respondents' reentry experience. The data was collected monthly from August 2016 to May 2017. At the time of data collection, the men in the study were housed at a medium-security State Correctional Institution (SCI) in Pennsylvania that held five TC units. This SCI has a focus on substance abuse treatment and houses many short-sentence inmates, thus creating a unique prison environment that focuses on treatment and reentry unlike many other SCIs. This focus on substance abuse and reentry is the underlying theme of the TC-PINS project.

Residents of the TC were recruited to the study by Kim Davidson, a graduate student at The Pennsylvania State University working on the project. Computer assisted personal interviews (CAPI) were conducted monthly with participants in one of the TC units during the period of data collection. The CAPI consisted of both open- and closed-ended questions about their familial relationships, future expectations, treatment engagement, peer network measures, and their evaluation and experiences in the TC program. 84% of eligible respondents completed at least one CAPI during their time in the TC unit. Overall, 470 CAPI surveys were administered to 177 male prisoner respondents.

TC participation is required for inmates who score at a six or higher on a drug screen administered upon entry into the state system as a parole stipulation. If an inmate chooses not to participate or leaves the TC program early they are required to serve their maximum sentence instead of being eligible for parole at an earlier date. TC programs in Pennsylvania last for four months and consist of 3 phases. The first phase, called the "induction" phase, lasts for one month. The second phase, called "primary treatment", lasts for two months. The final phase, called "reentry", lasts for the fourth month. Residents enter the unit on a rolling admission system and "phase up" based on their entry to the program. TC program residents remain isolated from other inmates in the prison during their time in the program. The TC unit studied during this project houses 62 residents at a time who are continuously engaged in peer interaction. This includes treatment groups, going to and having meals together, daily yard time together, and downtime spent together. Residents attend meetings and treatment groups Monday through Friday from 9 AM to 4 PM, with breaks for meals and inmate counts.

Sample

Of the 210 residents in the TC program, 177 inmates completed at least one CAPI during their treatment months, with participation declining with each successive month of treatment. The average age of respondents was 36.85. 58% of TC program residents were White, 35% were Black, and 7% were Hispanic. The average for the highest grade completed was about twelfth grade for the entire unit and the sample. The average IQ fell between 90 and 109 and the average offense gravity score fell between 6 and 7 for the entire unit and the sample.

Inmate TCU scores are measured using the TCU Drug Screen II during the prison intake process. Possible scores range from zero to nine, with an increasing score indicating the severity of substance use disorder. As stated above, a score of six or higher results in a requirement for TC program participation. Inmates who score below a six can still be required to participate in the

program as a stipulation of parole or may voluntarily enter the program. The TCU Drug Screen II also measures drug of choice by asking inmates to indicate the substance that is the primary source of their disorder. The largest drug use group in the entire unit and the sample is opiates followed by alcohol and then crack/cocaine.

TC-PINS participants who would be eligible for parole in the year following data collection were asked to participate in three qualitative interviews detailing their reentry process. The criteria to determine participation in the qualitative interviews included inmates incarcerated at a specific state prison in Pennsylvania, completion of the TC program while incarcerated, a history of substance use, and release from prison within a year of the start of data collection. Eighty-eight men were interviewed prior to community reentry, with the promise of $25 monetary incentives should they continue to community interviews upon release.

Qualitative Interviews

The TC-PINS study also utilizes longitudinal semi-structured interviews with eighty- eight residents of the TC unit who were eligible for parole and community release. Up to three interviews took place per respondent: one while still in prison and two in-community interviews. The current project focuses only on the in-prison, pre-release interviews, all of which were conducted by Kim Davidson, a PSU graduate student who also built rapport with the men during prior survey data collections. At the time of this project, thirty-two of the eighty-eight total interviews were transcribed and eligible for inclusion in this study.

The in-prison interviews provide baseline information and perceptions of the future from respondents prior to release. This baseline information includes information about the respondent, their family life, how their substance use and criminal behavior began, their drug of choice and other drugs they have used, previous incarceration experiences, and previous treatment program experiences. These in-prison interviews detail life history narratives, including a focus on criminal behavior and substance use, the respondents' experiences in the TC program, and their plans, expectations, and concerns for their reentry experience. Interviews took on average between 90 and 120 minutes. Although not the focus of this study, in-prison interviews are followed by community interviews focused on the respondents' lives since their prison release. This will include expected and unexpected challenges faced during reentry, substance use relapse, treatment program participation, family reunification, and employment, among others. It is expected that some respondents will recidivate and return to prison. These respondents will still be interviewed and will be asked about their experiences during the time that they were out of prison. To encourage participation for community interviews, a monetary incentive of $25 will be offered to respondents for each post-release interview.

All interviews (in-prison, community, and reincarceration) are audiotaped and sent to Datagain, a transcription service. The transcripts are then redacted to remove all identifying information. Once the transcripts have been transcribed and redacted, they are uploaded into a computer-assisted qualitative data analysis software program (CAQDAS) for coding. The CAQDAS program used for this study is NVivo, which facilitates the movement between data collection and analysis, writing memos, coding, and creating models (Bringer, Johnston & Brackenridge, 2006). The interviews are coded for recurring themes by undergraduate and

graduate students using NVivo coding. NVivo coding assigns a word or short phrase to similar narrative content within the interviews (Saldaña, 2009). Current codes include family life, entrance into substance use, opinions on the TC program, daily prison life, and goals for reentry.

Current Study

The current study is a smaller project within the TC-PINS study. The author was given access to thirty-two transcripts and conducted a preliminary reading of ten transcripts. This preliminary reading was conducted to inductively identify an overarching topic and hypothesis that could then be tested with the remaining transcripts. Based upon a reading of ten interviews, I chose to focus on fatherhood and its effect on men's desistance narratives prior to prison release. The transcripts were first coded into two categories: fathers and nonfathers. This was done using an item from the TC-PINS survey that asked, "*How many biological children do you have?*" Anyone with a non-zero response to this item were coded as "fathers." A total of 25 men were identified as fathers and thus used as the final sample of this study. The author read the transcripts in-depth, identifying themes that were present amongst the narratives to understand who prioritized fatherhood and why.

Results

	Prevalence of Theme	Explanation
Guilt* ● **Missed Time** ● **Financial Responsibilities**	**72%** 60% 44%	Guilt due to: 1) missing important events such as holidays, birthdays, academic events, and life achievements due to incarceration and/or 2) the inability to provide financially for their children. This extended beyond necessities to things the children wanted as well (such as new clothes or a car)
Positive Role Model	**40%**	The desire to be a positive role model in an attempt to keep their children from following in their footsteps.
Fear	**27%**	Fear that they would lose their children due to their inability to change. Further, they didn't want their children to end up ashamed or hating them nor did they want their past actions to negatively affect their children's lives.

Encouragement from Children	**20%**	Children who understood their father's current situation were encouraging them to receive help while incarcerated so that they could come home.
Relationship with Mother of Child ● **Positive** ● **Negative**	**64%** 20% 44%	Some of the fathers maintained civil co-parenting relationships with the mothers of the children despite no longer being in a romantic relationship with them. On the other hand, some of the fathers experienced negative relationships with the mothers which complicated the reunification process post- incarceration.

*For the theme of guilt, respondents spoke of guilt due to missed time, the inability to provide financially, or both. Thus, the individual breakdown of the two sub themes (missed time and financial responsibilities) do not add up to 72% for the overall theme.

**For the theme of relationship with the mother of the child, those who still in a romantic relationship with the mother of the child were not coded as positive. Further, the narratives that did not have a clear indication of a positive or negative relationship with the mother of their child were not coded.

Many of the fathers interviewed recognized that their substance abuse and incarcerations had significant impacts on their families, especially their children. A large majority of the respondents expressed extreme guilt, not only because of their actions, but because of the effects that they had on their loved ones. The desistance narratives pointed to self-reflections during their incarcerations that led them to these realizations. Further, it provided a sense of motivation to remain sober and crime-free once released in an effort for many of the fathers to reestablish relationships with their children. 72% of the fathers expressed guilt over missing important events in their children's lives, their inability to provide financially for their children due to their incarceration, or both. Whatever the reason, each of the fathers used their guilt as motivation for their upcoming release to ensure that they did not return to a life of drugs and crime for the sake of the relationship that they had, or hoped to have, with their children.

Missed time in their children's lives

Many of the desistance narratives had a similar topic of the fathers missing important events that were occurring in their children's lives. 60% of the fathers felt not only guilt, but also regret, that they would never be able to get back many of these memories. For some fathers, the events they were missing were holidays and birthdays due to incarceration:

I mean like, like I missed his birthday and Christmas three years in a
row. (28-year-old white male with 1 child)

While for other fathers it was academic and social events that were important to their children that they were unable to be present at:

> I missed the whole senior year of high school. You know what I mean?
> I ain't get to walk him across the court on his senior night for
> basketball. (36-year-old black male with 3 children)

Most of the fathers spoke about missing important events in a child's development such as the ones above. However, three of the fathers interviewed had even missed a child's birth. These fathers seemed to express not only guilt and regret at not being there to see their child born, but even pain.

> Well I was incarcerated when she was born, so most of her life, most of her [Age 2]
> years, I've been incarcerated. (34-year-old black male with 1 child)

> And my second daughter, I didn't even meet her yet. She's a year old. I
> didn't meet her yet, so I would really— I would love to get out there
> and work out things with —with my kid's mom, get back together, and
> raise
> my daughter. So, I'm having a change of heart now. (45-year-old white male with 1
> child)

> Interestingly, some fathers expressed that the missed time in their children's lives led them to feel a phenomenon one such respondent labeled as a "part-time dad."

> It's like I missed out so much with my family's life. It's bits and pieces
> of it. Being a part-time dad, I'm only here part-time. Then when I go
> home, I feel as though I can't really come out and start acting like your
> father
> because I ain't really been here. Now, what your dad, you wanna come home
> and play dad now? No, it doesn't work that way. (56-year-old black male
> with 3 children)

The belief that they had been "part-time dads" led those fathers to worry about the reunification process with their children. Since they were only present sometimes in their children's lives, these fathers worried about how to interact with their children, how to discipline their children, and even who their children had grown to be (personality-wise). They recognized that being a parent was a full-time job and due to their previous actions, they had only been partially present. This realization led these fathers to be excited about the possibility of being present all the time once released, but also created some fear about the process.

Missing time in their children's lives acted as a catalyst for change for these fathers. They recognized that while they could not change the past they could change the future. The inability to "make up for lost time" was a sentiment shared across many desistance narratives but as was their determination to "get back out there" and be a better father to their children in the future. Many of the respondents recognized that these events and achievements in their children's lives were a large part of parenthood and many included the desire to be present at all future events as a part of the future they imagined for themselves post-release as crime and drug free, as well as overall better fathers.

Providing financially

When speaking of challenges that they had faced, many of the respondents spoke of financial challenges. The fact that they had kids to provide for only made it that much harder for them. Many of the fathers that spoke of financial challenges recognized that they wanted to be able to provide for their children financially but were hindered because of their record or their incarceration. For many of these men, prior to their incarceration, they used drugs or crime as a source of income. Now that they were on a perceived path to desistance, finding a stable income represented a problem for their post-release lives.

> So, it's, that's going to be the toughest struggle I think is the financial part.
> But I'm willing to sit at home for the next year with my kids, do nothing and save
> my money. And if that's what I got to do that's what I go to do. (29-year-old white male with 2 children)

> I'm not prepared at all. I'm afraid. I have to face outside life…I have to get a job. I don't have a GED, so it's gonna be harder. And I'm a - I'm a convicted felon. I have to get myself enrolled in programs to better my life and stay stead out there, and I have to worry about getting my own place… (24-year-old Hispanic male with 2 children)

Other men recognized that although they would probably have to work minimum wage jobs once released it would still be better than the prison labor that they had worked and would ultimately be worth it for their children.

> Challenges? Probably financial would be the biggest. I've got two beautiful boys out there and a wife, yeah, financial. And the big thing for me is I don't want to get overwhelmed and fall back on like old habits, old thinking, go down that road. So, I've just got to stay humble, I've got to stay focused. The big thing I learned last time, unfortunately this is the second time, the thing I learned last time, is when I got out of prison last time, I started working at Wendy's, working at a fast food joint, flipping burgers and I thought I would be embarrassed and all, but I wasn't. Because you work in here for 24 cent an hour, well you can work there for $8 an hour, so I did that for a

while and things were fine and I was very humble about it. (34-year-old white male with 1 child)

For many fathers interviewed, it was not simply about providing financially for the things their children needed but also the desire to provide the things that they wanted. Two of the men had children who had entered the driving phase of their lives and expressed the desire to be able to buy their child a car.

My son, I just wanna- he's got his permit, so now, he can drive with it with a driver, with a licensed driver, and I'm looking forward to buying him his first car. Six months, and well, now, it's like four months he'll be able to get his license. I'm looking forward to buying him his first car. He wants all these cars, he's out of his mind, but he's getting a little shitty hooptie, you know what I mean? I can't wait to get it for him. (37-year-old white male with 2 children)

For those who have been incarcerated, finding a stable income that is also large enough to support a family can be extremely difficult. It is one of the challenges that often leads many to recidivate post-release (Morenoff and Harding, 2014). The stories in the desistance narratives often showed that these men recognized the difficulties they would face financially post-release, but it was less so about themselves and more about their children. 44% of these men wanted to provide financially for their children and feared not being able to. Being able to buy their children new school clothes, a car, or even help with college funds shaped their post-release thinking.

Financial challenges play a large role in the reentry process for most inmates (Morenoff and Harding, 2014). Most inmates don't have a stable job or a family able- or willing- to provide for them once released leaving the temptation to return to crime daunting. For these men, the desire to provide financially for their children adds a layer of complexity to the financial challenges they will undoubtedly face post-release.

While guilt was the largest theme present across the desistance narratives, in terms of reasons to change, it was not the only one. Fear also played a large part in the desistance narratives that I describe further in the next section. 28% of the fathers were afraid that they would lose their kids or that their kids would end up hating or being ashamed of them if they were unable to change. More positively, some fathers spoke of the desire to be better role models for their kids once released. And others said that the encouragement that they got from their kids played a large role in their hopes to change.

Fear

Fear was another theme that was in 28% of the desistance narratives. Many of the fathers recognized that they could possibly lose their kids if they did not change. The fear of losing their children forever worked as a driving force to make this time different from their past incarcerations and bouts with substance use.

> Cause I know deep down that I'm going to lose my kids if this doesn't change. (31-year-old white male with 2 children)

More specifically it was the possibility their children would end up being ashamed or even hating them due to their inability to change their ways.

> My biggest fear is continuing to fall and to wind up being like my father in the end and just spending the rest of my life in and out of jail. That's my biggest fear and for my kids to hate me. That's my two biggest fears cause if my kids were to decide to hate me, to be honest with you, I wouldn't want to live any more, if I don't have my kids. (32-year-old white male with 2 children)

> She might with her little friends and stuff like that. Then she, they said, "Oh, well. My father's this, my father's this." Then she, "I can't really talk about my father, cause my father is in prison." I had to think about how that makes her feel. When she was little, it was easy to get around it but now that they're mature, they have their little people, they have their people. They have their own minds.
> (56-year-old black male with 3 children)

One father spoke of his fears that his past actions would make his daughter a victim of his circumstances.

> Oh, bring your Dad to school day — "I can't. My Dad's in jail." That's a huge fear for me, man. That's deep to me. I don't want her to be a victim of my circumstances because she doesn't deserve it. She didn't do anything wrong. She hasn't done a thing wrong. (28-year-old white male with 1 child)

This thought goes back to the self-reflections that occurred in many of the men that their actions didn't just affect them but their families too. For this father, the realization that, despite her innocence, his daughter's life could be impacted because of decisions he made was a large force to make him want change.

Fear is often an undiscussed emotion when dealing with incarcerated populations. The thought of the re-entry process can bring about large levels of fear and anxiety at what the future holds. Many inmates fear the inability to find a job or a home, being unable to remain drug and crime free, or even simply returning to society.

But across these desistance narratives many of the fathers spoke of fear in relation to their children. The idea that their drug use could end up affecting their relationship with their children was a fear that many men held. It was a strong enough fear that many men were using to remain sober and crime free once released to ensure that they could ultimately make their children proud.

Desire to be a better role model

40% of the fathers interviewed expressed the idea of wanting to better themselves to be a better role model for their children. They recognized that they currently represented something that they did not want to see in their own children and that the best way to help their children was to help themselves. Many of the respondents simply said that they didn't want their children to end up like they did.

> This is the time where I gotta help him figure out what he's gonna do with the rest of his life. I don't want him to end up like I did.
> (37-year-old white male with 2 children)

While others recognized that they were the only adult figure that their children, particularly their sons, would listen to and aim to be like.

> I don't want my kids following in my footsteps, I don't want to have to go visit my kids in jail and stuff like that, writing letters so I know, especially my son, the only person he's going to listen to as a person is me, their mother can have as many guys in her life as she wants but deep down inside they're going to realize "that's not dad, only my dad can really speak to me and show me how to be a man," so that's what I'm going to do. (31-year-old white male with 2 children)

One respondent even said that he was afraid that his own son was only a short time away from the period in his life where he began using drugs. It was this fear that led him to want to be a positive role model for his son as well as other children in the community.

> One that that I would like to do and I'll run this by parole when I get hime, is I would like to see if there is somebody I can like talk to, like teenage kids and share my experience like how I went down this awful path and ended up in these places. Because my son is going to be [Age] in April, a month after I get home and it scares the heck out of me to think that he's four years away from where I started using. So, I would like to share with like kids his age, like his friends and stuff like that, like the bad decisions that I have made and how they affected me, my family, you know I'm a convicted felon now, that limits me to the things I can do. So, I would like to share that experience with them and it's something that I would like to talk to drug and alcohol when I get out there and see if there is some sort of

meeting place where I could speak, I would like to do that, so if I could help somebody. (34-year-old white male with 1 child)

These men recognized that, despite their pasts, they had the potential to be positive role models in their children's lives. Many had children who they felt were at an impressionable time in their lives and needed someone to steer them in the right direction. While many understood that they could not do that while incarcerated, they looked forward to their time post-release to correct past actions and be the role model their kids needed. Their determination to remain on the path to desistance was a large step in ensuring that their kids could look to them as a person they should aspire to be. By remaining drug and crime free, finding stable and legal employment, and being a role model to their communities, these men hoped to show their kids their full potential even in their young lives.

Encouragement from children

Interestingly, some fathers spoke about the encouragement that they were receiving from their children to change was playing a large part in their desistance journey. One father could build a better relationship with his daughter in between prison stints and was using her encouragement to keep a positive path.

> I didn't get arrested since 2006 so this is the time I was out there a while a
> built a good relationship with my daughter where this little incarceration
> that I had to do, like before, she did not want to talk to me, not want to
> write me, all my letter down and everything. It was like an issue like that,
> but this time,
> she stood by my side and wrote "Dear old dad, I know you could't do the
> right think. You were doing the right thing out there. You had a little bit of
> cocaine on you. It wasn't that I was…" She understood more this time. She
> said, "Just go get yourself right and come out and we'll move on from that.
> She stood by my side and encouraged everything all the while where before,
> she didn't.
> (51-year-old white male with 2 children)

Similarly, another father had a young son who also was encouraging him to get the help that he needed so that he could return home.

> My close family, my brother, sister, mom and my [Age]-year old son, you
> know he said, "dad I love you I just want you to get the help you need, come
> home so I can whip you in basketball," he's a good basketball player.
> (34-year-old white male with 1 child)

Further, this father recognized that he was lucky to have a family that was encouraging him to do well because he saw many other incarcerated men who did not have that same support system.

But it's also I mean I am very grateful and especially with the holiday season here I see other guys, I feel very sorry for them, that they don't have as much out there. So, I am very grateful that I have all these people that I care about, and they visit me and rooting my book and etcetera, etcetera. So, it's been very eye opening, it's humbling, and it's taught me a lot of patience, I mean it's the only way I can put it. That's what I told parole too, it's humbling it keeps your patience in check. (34-year-old white male with 1 child)

Many of the desistance narratives that included men whose children were encouraging them to do better came from those who had older kids. These children were able to understand their fathers' plights and circumstances. Regardless of their father's past actions, the fathers perceived that their children could build a bond strong enough to stand in support of them. From the fathers' perspectives, the children could understand that their fathers needed help and while incarceration took them away it may be the only chance they had at getting better. Overall, these children simply wanted their fathers to receive the help they needed so that they could return home and stay home permanently. More importantly, they believed that it was possible for their fathers to get better. In a way this encouragement helped to motivate the fathers because they did not want to let their children down. Their kids were encouraging them to do better because they believed that they could do better. To relapse or return to jail would not only jail themselves, but also fail the children that had stood by their sides during their current incarceration.

Throughout many of the desistance narratives, parenthood was not just about the relationship with their children, but also the relationship with the children's mother. While 20% of the fathers still maintained positive relationships with the mother of their children, 44% had negative and even sometimes hostile relationships with them. I turn to the complicated issue of relationships between incarcerated fathers and their children's mothers in the next session.

Negative relationships with mother of child

Those who spoke of negative relationships with the mother of the child also spoke of how this complicated the process of building relationships with their children. For some of the respondents, the relationship with the mother had disintegrated so badly that the mothers would no longer allow the fathers to contact the children.

No. I have partial custody at ho1me, I get them every other weekend, I don't — their mother moved, I don't know their address, we argue, she won't give me her address, stuff like that and apparently, I talked to my brother and she's told him "I'm moving back to [Country]." Or something, I don't know…I don't really know what's going on, so that's stressful… I mean I got Christmas — my son's birthday just passed, his [age], and I wanted to write him, like send a birthday card up to him, can't even see them to him. So that sucks. (31-year-old white male with 2 children)
So, I don't blame… my baby mom for finding somebody else, but, yeah, since

she found someone else, she hasn't had time to pick up the phone let me talk to my kids. (24-year-old Hispanic male with 2 children)

The respondents with negative relationships with the mothers of their children also spoke of domestic violence that occurred between them and the children's mothers.

I mean for my situation, I'm not gonna lie, the mother of my children kept punching me and punching and I kept wanting to leave, I gripped her up and told her listen go and she kept punching me so I'm not gonna lie, I smacked her. Do I know it was wrong, yes. (31-year-old white male with 2 children)

She used to abuse me physically, like she sliced me all that…We used to fight a lot. (28-year-old black male with 2 children)

While for other respondents, it was simply their inability to change their ways that led to a negative relationship with the mother of their children.

We were fighting a little bit, cause like I said, I wasn't there. She just had — our daughter died. Our first daughter died like six hours after she was born, and then I knocked her up again, so she was like upset that I wasn't there. She needed me. You know what I mean. I wasn't there, and then I'm — I'm lying or she could tell— she couldn't catch me, but she could tell I was doing something, and I wasn't supposed to be, and then, like I said when her brother told her I was getting high, we had a huge fight and then I— I was on the phone like every day. And I was talking to her one day, and she was in the hospital and the doctor make her have the baby prematurely, induced labor, like six months pregnant. So, she was going through that. Then the day the baby was born, I'm trying to get her to fucking get her sister to put money on somebody's book, so I can get high. And she — she hung up on me, and then we talked a little bit for like two weeks. The baby was in an incubator, so she was driving back and forth from [town] to [town], and I asked again. I was bitching about money, and she was like, "You know what? Fuck you." Hang up. I haven't talked to her since (45-year-old white male with 1 child)

Regardless of reasons why the relationship was no longer cordial, the desistance narratives that chronicled a negative relationship with the mother had a parallel theme of that negative relationship influencing the relationship with the child. Many of the fathers who had negative relationships with the mother of their children still hoped to build a relationship with their children but found the process complicated, and sometimes completely hindered, by the mother.

20% of the men had been able to maintain positive relationships with the mother. Many of the men maintained a positive relationship with the mother of their children because they were still in a romantic relationship with them. However, some men were no longer romantically involved with the mother and were still able to maintain a working relationship. This working relationship even came to be beneficial for their reentry process as the mothers were taking steps to help the men get back onto their feet.

> I'm going to my daughter's mom's house until I can get a place of my own and get back to work. I'm lucky enough that she's gonna let me use the other bedroom there. (28-year-old white male with 2 children)

> And my son's mom, we had a falling out right before I got locked up and we didn't talk for the first year I was locked up, but she contacted me six or seven months ago, and we've been getting along great. She's the person that's helping me, so that I don't have to go to a halfway house. She's paying for the first two weeks in a recovery house. I just put my home plan in yesterday and now, she's sending me money, and she's got money, she put money on the phone so I could talk to my son, so I could talk to her, and she's riding out. (37-year-old white male with 2 children)

Other respondents acknowledged that while their past actions had affected their relationships with the children's mothers, the moms were still willing to give the men a chance.

> I've got a wonderful daughter. Her mom is— I dragged her through the mud for this long. We're not together, but she'll still always love me as a person. She didn't take that from me. (28-year-old white male with 1 child)

> Me and her we have a relationship to whereas though I told her so much stuff she doesn't know whether to believe me or not. But I think she's willing to give me a chance because she want me to be in their lives and I wasn't to be in their lives. (47-year-old black male with 3 children)

For these men, having a working relationship with the mother of their children often allowed them another avenue for support. These mothers seemed to support the fathers in hopes that they could ultimately do better and be better for their children.

For some of the mothers, this meant helping to provide financially while for others it was simply giving the men another chance to prove themselves. Nonetheless, the fathers who maintained positive relationships with the mother of their children often spoke of not only their children but also the mothers in relation to their post-release lives.

The only reason to remain sober

For these men to be successful in remaining drug free and crime free post incarceration, they need to have a desire to remain sober for themselves. But a small number of men who were interviewed said quite honestly that their kids were the only lifeline they had to remain clean. Many insisted that if they didn't have their kids they would go back to substance use.

> And that's like — for the first time, I always look out for myself. You know what I mean? I'm a selfish motherfucker, but now I don't want that. And if she don't let me see my daughter, then, I'm probably gonna say fuck it and start shooting heroin again. It's the reality of it. You know what I mean?
> (45-year-old white male with 1 child)

> That, if I don't have that, I know that I should say, fuck the maintenance and just shoot dope. I know I will because I have nothing new, no reason not to. If my kids don't want to be a part of my life, my family didn't want to be a part of my life, no matter what my decision is, no matter what I'm doing. I won't have a reason. I wouldn't if they rolled out on me and just said, Fuck off." I wouldn't even do right. I know I wouldn't. I wouldn't have the drive to do right. Not for myself, just fuck it. That's how it would be. (29-year-old white male with 2 children)

> I don't know if I would have this same ambition to be clean and do the things — and go down the road if I didn't have them. (34-year-old white male with 1 child)

Across the desistance narratives, while the men spoke highly of their children as their primary motivating force to desist, they also spoke of other reasons to desist. The men wanted to become productive members of society, they had grown tired of the crime-incarceration cycle, or even the fact that they were aging. However, a small portion of the men lacked these motivations. Rather, they simply had their kids as their only motivating force. When faced with the reality that they might not be able to reunite with their children, these men were honest in that they would go back to substance use because they had no other motivations to keep them drug and crime free.

There were a variety of themes present across the desistance narratives that detailed the complex relationship between incarceration, desistance, and fatherhood. A large majority of the fathers interviewed wanted to (re)build relationships with their children post-release. Unfortunately, these desires were often complicated by other factors that strained their relationship with their children. Many men interviewed dealt with guilt due to their past actions that led them to miss important events in their children's lives, as well as their inability to provide financially for their children. These men also dealt with fear that they could ultimately lose their children entirely (either by custody or simply a disintegration of a relationship) or that their children would end up being negatively affected by their actions.

Both the guilt and fear that they consistently faced could drive the respondents to pursue desistance post- incarceration to build better relationships with their children. While these were negative motivators for the men, there were some positive motivators that were detailed throughout the desistance narratives. Many of the men had a desire to be better role models for their children. Although they represented something they didn't want their kids to be like at the beginning of their incarcerations, many of the men felt that they currently could provide a positive role model that would continue into their reentry journey. By staying drug and crime free once released, these men hoped to show their children that they could be positive and productive members of society. Some men had maintained good relationships with their children while incarcerated. These children, often older in age, realized that incarceration could allow their fathers to get the help that they needed. While these children noted that they wanted their fathers to return home, they first wanted their fathers to get help for their addictions. Nonetheless, they believed that their fathers had the potential to overcome their drug abuse and return to society. For these men, maintaining a drug and crime free lifestyle meant living up to their children's expectations and beliefs for them. To fail was to let their children down, and many men believed that their children didn't deserve to be let down once again.

Being a parent is not just having a relationship with the child, but also one with the other parent. Among these men, there were those with positive and negative relationships with the mother of their children. While some were still in romantic relationships with the mother of their child, many were not. For the men who had negative relationships with the children's mother, the relationship complicated reuniting with their children post-incarceration. Some of the mothers had simply cut off communication with the child or wouldn't allow the fathers to see their children. Others had simply gotten tired of the father's inability to change.

But for other men, the relationships with the mother were so bad that violence was involved, both physical and verbal. These men, despite their desire to reunite and create a bond with their children, found it difficult to do so because of the relationship they had with the mother of the children. On the other hand, some of the men maintained positive relationships with the mother of their children despite no longer being romantically involved. These men had found another support system that was encouraging them to get better for the sake of their children. Many of these mothers were supporting the men, not only mentally and emotionally, but also financially by helping them fund certain things in the reentry process. Though these mothers did not turn a blind eye to the fathers' past actions, they were willing to give them another chance to prove themselves because they wanted them to be involved in their children's lives. In sum, although it is clear from the fathers' narratives that children often act as an important "hook for change" toward a more conventional life, it is also apparent that staking one's desistance to fatherhood is often a precarious course. Relationships with mothers and the children themselves may be tenuous or uncertain, potentially derailing positive expectations the men developed in prison. Additionally, financial and caregiving responsibilities may be difficult or unrealized because of (1) the stigma attached to incarceration, (2) the limited opportunities associated with disadvantage, and (3) the personal deficits that initially brought the men into the criminal justice system. Even though the narratives reviewed in this study pointed overwhelmingly to children as a positive source of

change upon reentry, the challenges associated with fatherhood may explain why prior studies do not identify fatherhood as a strong correlate of criminal desistance.

Discussion

Based on the results of this study, the fatherhood role is a central component of the desistance narratives of the sampled inmates with children as they prepare to reenter their communities. 84% of the respondent fathers mentioned their children as the most important reason to desist post-incarceration. For these incarcerated men, they recognized the need to remain drug and crime free to (re)establish and maintain healthy relationships with their children. As for why fatherhood was important to these men, five themes emerged across the desistance narratives in varying prevalence: guilt, the desire to be a positive role model, fear, encouragement from their children, and the relationship with the children's mothers.

Guilt was by far the most prevalent theme, with 72% of the fathers discussing it in their narratives. The fathers discussed missing important events and milestones in their children's lives due to substance abuse and incarceration. This included birthdays and holidays, but also academic and life achievements such as graduation or passing the driving test. Three of the respondents had even missed the birth of a child due to incarceration. The fathers stated that, even when they weren't incarcerated, they weren't there for their children as much as they should've been due to their substance use. They expressed guilt that they weren't there for their children during these important moments, along with disappointment that they'd never be able to get these moments back.

The desire to be a positive role model was also an important theme as the incarcerated fathers recognized that they did not want their children to follow in their footsteps. They discussed how imperative it was to better themselves to keep their children on the right path. This included remaining drug and crime free post-incarceration, as well as getting a job or furthering their education. One respondent wanted to be a positive role model for his son and other kids around that age in the community.

He discussed wanting to talk to other kids in the community about his own experiences with substance use and incarceration and how these behaviors had affected both himself and his family.

Fear was discussed by the respondents in relation to them losing their kids, their kids hating or being ashamed of them, or their kids being affected by their actions. More positively, a few of the men (20%) were receiving encouragement from their children that they could use as motivation to desist. From the perspective of the incarcerated men, these children wanted their fathers to get the help needed while incarcerated so that the men could return home.

The respondents who could maintain a positive relationship with the mother of their children had a much clearer path to reunification with their children. While these fathers were no longer in a relationship with the mothers they managed to maintain a civil co-parenting relationship that ultimately allowed them access to their children. In addition, these fathers also found another route of help for the reentry process. These mothers helped by paying halfway house fees or even lending out the spare bedroom during the process.

Although nearly all the men expressed the desire to reunite with their children post-

incarceration, the process for many of these men would not be easy. 44% of the fathers had negative relationships with the mothers of their children, which complicated or completely prevented the reunification process. These respondents were dealing with domestic violence and custody issues with the mothers. Other respondents couldn't get into contact with the children because the mother's refused to allow it. One mother had moved and refused to give the father her new address, while another father attempted to call the children but found that the mother wouldn't answer the phone. Despite the genuine desire to reunite with their children once released, the path to reunification for these men remained unclear. Another factor that had the ability to complicate the reunification process was some fathers' inability to provide financially.

Throughout the narratives, the fathers spoke about how imperative it was to find a job post-release. They discussed many re-entry plans that would require funds, including paying for a place to live, medication, reliable transportation, and providing for their children. The men expressed guilt because they felt that they couldn't buy things that their children needed or wanted, such as clothes for the new school year or a car after they received their licensed. Finding a job post-release would help them provide for their children in ways they weren't previously able to while incarcerated. However, many of these men were going back into disadvantaged communities where there were already few opportunities. Their prior incarcerations, and the stigma associated with these experiences, would only further slim down the already few job opportunities, making it extremely hard for them to find adequate work. This inability to provide financially for their children could possibly hinder the reunification process with their children post-incarceration.

Currently, the TC program doesn't include parenthood and child reunification in its treatment curriculum. Based on the results of this study, it may be helpful to implement parenting sessions as a part of the program. This may help the participants who are fathers begin the reunification process with their children. Considering that the TC program occurs at the end of the men's sentences for most inmates, including more parenthood programming would be important to begin helping the fathers start the process of reuniting with their children. Utilizing parenting sessions in the TC program can help the men prepare for the role of being fathers in a controlled environment.

The narratives utilized in this study laid out the expectations of the respondent fathers for their reentry into their communities. The next step is to analyze how these expectations translated into reality and why. Two community interviews will be conducted with this study's respondents, one 3 months post-incarceration and the other 9 months post-incarceration. Using these interviews, we cannot understand the actual, rather than expected, reunification process. While some of the fathers will be able to draw on the relationship with their children to find success in remaining drug and crime free, other fathers will not and are greater risk of recidivism. These post-release interviews will help to further the understanding of the desistance and recidivism process. It will allow the analysis of how fatherhood plays a role in the men who recidivate as opposed to those who desist.

Future Research and Limitations

Despite the positive directions of the results presented in this study, there is still much to learn on the complex relationship between fatherhood, incarceration, and desistance. This study had a rather small sample size of 25 respondents. Further, the sample is limited to men with substance abuse issues participating in a TC. As such, the findings presented may not be generalizable to the general inmate population.

The narratives presented in this study were produced while the men were incarcerated. Thus, they represent the expectations of these men for their reentry process. Going forward, it will be necessary to analyze how these expectations translate into reality and why. While some of the fathers will be able to draw on their relationships with their children to find success in remaining drug and crime free, others will not. Using the two community interviews it will be possible to further analyze how fatherhood plays a role in the men who will desist as opposed to those who will not.

Conclusion

In sum, the fathers in this study hope to reunite with their children post- incarceration. The hope at having a healthy relationship with their children is a strong motivating force for these fathers to remain drug and crime free post-incarceration. However, prior relationships with mothers and children and financial responsibilities could complicate the reunification process. The fathers who are unable to reestablish this relationship may ultimately lose the motivation to desist once back into their communities. Without a motivation to desist, it is highly likely that these men will return to substance abuse which will almost inevitably lead back to crime.

Understanding recidivism has become a major criminological concern. This study is particularly unique because the in-prison interviews happen right before the release of the respondent fathers. So, the expectations of the men are captured at a major transitional period in their lives. If it is possible that fatherhood can act as motivation to desist then it is necessary for advocates in the criminal justice field to take advantage of this. However, if this proves too complicated of a variable then these advocates must find another motivation to help those in this situation desist.

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The Perceptions Atypical Cyclists have on Cycling Clubs and the Cycling Community

Jacqueline Beltran, McNair Scholar, The Pennsylvania State University

McNair Faculty Research Adviser: Melissa Bopp, Ph. D
Assistant Professor of Kinesiology
Department of Kinesiology
College of Human Health Development
The Pennsylvania State University

Abstract

At present, there is limited research regarding the barriers and stereotypes ethnic minorities cyclists perceive within the cycling community. An online survey was distributed to members of minority cycling clubs across the U.S. it used open-ended questions on different aspects of their cycling involvement, including their perceptions of a stereotypical cyclist. Basic demographic information was also collected. Responses were coded, and themes identified using NVivo. Participants (N=33) were mostly older adults (Mage = 51.21 years, SD =11.20), and predominantly African American (n=13, 68.4%), male (n=13, 68.4%), and held a bachelor's degree of higher (n=13, 68.4%). The themes that emerged when identifying a stereotypical cyclist were sex (n=16), age (n=13), education (n=13), health appearance (n=12), race (n=10), and no typical cyclist (n=4). Findings of this study provide an insight into the perceptions ethnic minority cyclists have in the cycling community. However, there were participants who felt there was no stereotypical cyclist.

Background

It has been found that regular physical activity participation decreases unfavorable health outcomes (Office of Disease Prevention and Health Promotion, 2018). Individuals who are physically active typically live longer and have lower levels of non-communicable diseases (NCD), mental health issues, and cancer (Office of Disease Prevention and Health Promotion, 2018). Despite the health benefits associated with physical activity in the United States (U.S.) it is reported that less than half of adults and children do not meet current physical activity recommendations (Office of Disease Prevention and Health Promotion, 2018). Furthermore, national data indicates that some ethnic groups are less active than others leading them to have significantly higher rates of NCD (CDC, 2017). The socio-ecological model depicts different factors that influence health behaviors (intrapersonal, interpersonal, organizational, community, and public policy) that tend to overlap and interact as the individual is affected by, or meets, various aspects of the socioecological model (Glanz, 2008).

The number one reason why ethnic minorities do not cycle is due to traffic accidents followed by fear of being assaulted while cycling (Brown, 2016). Other contributing factors to why minorities do not cycle include not feeling healthy enough to cycle, safety, not enjoying cycling, no social support to cycle, and having no bike (Schneider, Kusch, Dressel, & Bernstein, 2018). There are correlations between the design of the built environment and citizens cycling, a determinant that is considered stronger than income and ethnicity (Yu, 2014). Specifically, the lack of cycling lanes, unsafe characteristics of the roads, and no separation between bike lanes and

traffic can be discouraging to cycling (Manaugh, Boisjoly, & El-geneidy, 2017). Improving neighborhoods can lead to more citizens partaking in active transport (Yu, 2014). A study found that the mere presence of bike paths led to a higher frequency of cycling commutes (Manaugh, Boisjoly, & El-geneidy, 2017). Cycling instead of driving provides other benefits, such as reduced air pollution levels, which result in health benefits for the society and better quality of air for the environment (Hartog, Boogaard, Nijland, & Hoek, 2010).

Active transportation, such as cycling, can be a cost-effective way to help reduce the epidemics rising from NCDs, and an easy way to meet recommended physical activity levels. Despite the risks associated with cycling, such as traffic accidents and air pollution, it has been found that the health benefits gained from cycling are greater than the concerns (Fraser, & Lock, 2010). Other benefits induced by cycling include improved mental health, obesity reduction, and disease prevention (Oja et al., 2010). It is estimated that life expectancy gained from being active through cycling is 3-14 months greater than the expectancy of life lost potentially by air pollution (0.8-40 days lost) (Oja et al., 2010).

Cycling can foster opportunities for all community members to be active and help promote social interactions that were previously not present (Dressel, Steinborn, & holt, 2014). Cycling has been determined to be sociocultural and highly interactional due to individuals collaborating to achieve and maintain a mobile formation (Mcilvenny, 2013). Additionally, cycling in communities provides a form of surveillance that can aid community safety (Bopp, Sims, & Piatkowski, 2018).

In the U.S. 34% of adults rode a bicycle in the past year, 15% rode for transportation means, while 32% rode for recreational purposes (Breakaway Research group, 2015). Minority cycling rates may be higher than other ethnic groups, however most of time the cycling is not done leisurely, but instead as a means of transportation due to economic circumstances (Breakaway Research group, 2015). Ethnic minorities tend to live in environments that do not support or favor the community to be physically active, in part due to residential segregation, which creates and fortifies racial inequality in education, health, and socio-economic status (Williams & Collins, 2001).

The design of the built environment affects participation of cycling, a determinant considered stronger than others. Particularly, the lack of an environment providing accessibility to cycling lanes (Manaugh, Boisjoly, & El-geneidy, 2017). For ethnic minorities it is critical to have a supportive community, as minorities tend to cycle with their family more frequently than alone (Lusk, Anastasio, Shaffer, Wu, & Li, 2017). This may be difficult, as people who live in lower socio-economic environments tend to lack social support (Schneider, Kusch, Dressel, & Bernstein, 2018). Some reasons why ethnic minorities do not cycle is attributed to fear of traffic accidents and being assaulted (Brown, 2016). Other factors include ethnic minorities not feeling healthy enough to cycle, safe enough, not enjoying cycling, no social support to cycle, and having no bike (Schneider, Kusch, Dressel, & Bernstein, 2018). Minorities cycling tend to cycle as a means of transportation (Breakaway Research Group, 2015). Due to limiting literature on atypical cyclists, this study aimed to understand the perception ethnic minorities had on a range of factors about cycling.

Methods

Participants and recruitment

The National Brotherhood of Cycling is an organization of cycling clubs from across the United States that aims to promote a love of cycling, increase cycling's diversity, and decrease health disparities found in communities of colors (The National Brotherhood Association of cycling, 2018). In spring 2017 the 54 clubs that belong to the organization were reached out to for contact information. Of these clubs, 40 had published contact information on their websites. These clubs were contacted to determine if they would be willing to send out an email invitation to their members to participate in an email survey about participating in a cycling club. Six clubs indicated that they would be willing to share the survey, though other clubs may have forwarded the online invitation to the survey without confirming their willingness to do so. The clubs that responded were from across the United States specifically Illinois, North Carolina, Texas, Florida, and Georgia. Eligible participants were adult members of the cycling clubs. An informed consent statement was presented to participants when they opened the link from the email invitation. The Institutional Review Board at Pennsylvania State University approved this study.

Measures

Participants self-reported basic demographic information and responded to nine open-ended questions about their participation in the cycling club and perceptions of cycling (Table 1). The open-ended questions in table 1 were developed with input from experts in the field and members of the cycling community.

Table 1. Survey questions
Please list your top three reasons for cycling
Why do you choose to belong to a cycling club?
How were you introduced to the sport of cycling?
Describe a stereotypical bicyclist in your community
Agree with the stereotypes?
How do friends and family support/hinder biking?
Clubs to help break down barriers
Strategies to break down barriers
Health disparities

Analysis

Qualitative

A detailed coding book was developed grounded in a social ecological framework identifying links between individuals' health and their environment (Sallis et al., 2006). Responses to questions were coded by two independent coders; discrepancies in codes were discussed, using standard procedures of triangulation (Creswell, 2007). Coded data was entered into NVIVO 11.0 (QSR International). Themes were derived from the frequency that they appeared in responses from the open-ended questions. Demographics were analyzed using SPSS 22.0 (Armonk).

Results

Participant Characteristics

Participants (N=33) were mostly older adults (Mage= 51.21 years, SD= 11.20), and predominantly African American (n=13, 68.4%), male (n= 13, 68.4%), and held a bachelor's degree or higher (n=13, 68.4%).

Motives/Reasons for Starting to Cycle

Participants expressed several reasons and motives as to why they decided to start cycling. The most common themes that emerged concerned: improving fitness (n= 27), the social aspects of the activity (n= 20), enjoyment of the activity (n=16), physical health outcomes (n=9), to be outside (n=6), and to work on mental health (n=6).

Introduction to Cycling

Table 1 shows how participants were introduced to cycling, along with representative quotes. The most common way included introduction to cycling through friends, peers, and acquaintances (n=15). Followed by individual's self interest in cycling (n=8). Next was health, wellness, and performance (n=7); for example, one participant mentioned "I started cycling as a low impact workout when I was obese and needing to lose weight". Other ways in which participants got into cycling were through social events (n=3).

Table 1.

Themes	n	%	Representative Quotes
Friend/ peer/ acquaintance	15	45.45	"My neighbor invited me to a group ride. I went and have been hooked ever since."
Self interest	8	24.24	"Saw clubs riding through my neighborhood "
Health/ wellness/performance related	7	21.21	"I was introduced to a local cycling club by a spinning class buddy from a local gym."
Social events/ group rides	3	9.09	"Got into rode cycling when I got older and for introduced to groups."

Reasons for Belonging to Cycling Club

Table 2 reveals some of the reasons that participants decided to belong to a cycling club. The most common response (n=20) had to do with being social, with one participant remarking "I enjoy the camaraderie, it's a great way to learn and improve (lots of wisdom being shared on rides and meetings)." In addition to this desire to be socially connected the next most common response was to meet people with shared interest (n=9). There was also the mentioning of the safety gained in a cycling a club with a participant stating, "There's safety in numbers and to develop techniques for more efficient riding" (n=7). Other reasons to join a cycling club encompassed training logistics (n=4), challenge of being pushed and motivated by a group (n=3).

Table 2

Themes	n	%	Representative Quotes
Social	20	60.61	"The camaraderie, being able to talk to other cycling addicts-- it's like AA for cyclists"
Shared interest	9	27.27	"Meeting new people of similar interests and learning of different lifestyles."
Safety	7	21.21	"I was doing a lot of riding by myself and thought that riding with other would be enjoyable and safer than being on many desolate roads."
Training logistics	4	12.12	"Learn cycling techniques and etiquette from the more experienced "
Challenge	3	9.09	"Enjoy the challenge of riding with a group pushes me to ride faster and better"

Social Support

Participants also described the way family and friends impact their cycling. The number one way was through support (n=9), with one participant stating that "My friends support my participation and understand that I ride early in the morning on weekends so that limits the time that I spend out late the evenings before". Followed by family and friends not riding however still being understanding (n=6) and relationships being impacted with family and friends (n=6) one participant stated:

They are more conscientious motorists (or at least they claim to be) regarding cyclists because they know that I'm out on the road. That said, they typically call me to complain about what they consider to be bad cycling behavior. I do spend some time educating them that sometimes cyclists do things for our own safety, which may be upsetting about what they consider to be bad cycling behavior.

Other ways that family and friends impacted participants cycling were through not hindering nor supporting their participation in cycling (n=5).

Health Disparities

        The role cycling can play in addressing health disparities was also inquired about. Of the 33 participants, 15 stated that cycling improves their health. A participant stated," Significant health benefits and typically improves lifestyle which helps with stress effects". Other participants stated that it helped to decrease and deal with their diseases (n=4).

Stereotypes / Agree with Stereotypes

        Participants were inquired to identify the characteristics of a stereotypical cyclist in their communities. The first identifying characteristic being the sex (n=16) a participant stated that "[there are] both men and women riders although there are considerably more male cyclists". The next characteristic was age (n=13) with the most common age mentioned as being in the "40's and 50's". Income and education level were summed up with the statement of a participant that commented" Income level is at a point where a $1,500 bike is not going to take food off the table. Education is all inclusive" (n=13). As for health appearance (n=12) one participant stated that they "Tend to be healthier but usually have a health -related reason for cycling (diabetes, hip/knee replacement = cannot run)". Regarding race most of responses were Caucasian (n=10). However other participants found no typical cyclist in their community with a participant commenting, "I find all races/ ethnicities riding in my community" (n=4).

        Table 3 features some of the themes that emerged when participants were asked if they agreed with the stereotypes that had previously surfaced in a previous question on the stereotypical cyclist in their communities. The frequent response was that there was a specific race that was perceived as more likely to cycle (n=15). Income seemed to be a theme in which most participants agreed you had to have disposable income to participate in cycling (n=5). Gender was another theme that coincided with the responses of a stereotypical cyclist with a participant stating, "I can say that cycling in my area is more common to men" (n=3). Another theme to emerge was fitness level (n=3).

Table 3

Themes	n	%	Representative Quotes
Race	15	45.45	"The perception is Whites are more prone or seen cycling and have the means for the most hi-tech gear… Truth is cycling is not only a sport, it is an activity! It is not only for elite bullet fast athletes!"
Income	5	15.15	"Income- Generally need to be in a position to spend $500 minimum to start."
Gender	3	9.09	" Bike races even in the city of Chicago are still overwhelmingly white males"
Fitness level/ health/	3	9.09	"Many different cycling groups that have members that are made of all different speeds."

skill level/ ability			

Strategies to Overcome Barriers

Participant's shared some thoughts on the ways that cycling clubs can help to overcome some of the barriers in more diverse communities. The most prevalent response was hosting events (n=8) a participant stated that "Having more cycling events in communities that normally do not get to experience the sport". Followed by a similar idea which was that cyclists must be visible (n=4). Developing the infrastructure of communities that support cycling was also mentioned (n=3) and working alongside community leaders to breakdown some of these barriers (n=3).

Break down barriers

Table 4 describes some of the idea's participants had on ways to help break down barriers associated with cycling. Most participants stated being inclusive to all and different levels of riders (n=8). Another common response was to eliminate stereotypes with a participant stating what they already do in their cycling club "We work along with other organizations that promote cycling to African American youth in providing bicycles, teaching bike handling and maintenance" (n=6). In addition, further themes to emerge were to ride safely (n=4) and ride in different areas with a participant stating that his "club does make a point to ride in communities that normally would not see a group of African American cyclists" (n=4). Another theme to emerge was to set a positive example (n-3).

Table 4

Themes	n	%	Representative Quotes
Being inclusive	8	24.24	"Making a conscious effort to offer more developmental rides particularly with slow speeds for beginners"
Breakdown stereotypes	6	18.18	" I ride with my club (predominately black) to show everyone that cycling is a viable option for brown people too."
Ride safely and follow the rules	4	12.12	"Most importantly follow the rules of the road"
Ride in different areas or neighborhoods	4	12.12	"When people see cyclist of varying ages, races, body types ride, in their communities, they believe that it's an attainable goal/sport for them."

Social or political mechanisms	4	12.12	"They can work with political and social powers to encourage cycling"
Set a positive example	3	9.09	"Be the change you want to see… I ride… to show everyone cycling a viable option for brown people

Discussion

This study provides new insights into the attitudes and beliefs of the growing ethnic minority (atypical) cycling community that have the potential to inform policies and programs to promote an active lifestyle in diverse communities. Overall, the main themes that emerged regarding why participants started to cycle were to become fit and to socialize with others who were like them. Most of responses indicated that they were introduced to a cycling club through their social support network. Thus, unsurprisingly, family and friends were found to impact the rate of participants cycling many commented that cyclists join a cycling club to manage/prevent diseases. Participants also stated some of their perceptions on the stereotypical cyclist in their community and how to address breakdown of the stereotype. Ultimately, participants also expressed the barriers to cycling in ethnically diverse communities, which included the lack of visibility of atypical cyclists.

Fitness and socializing with others like them were the most prominent themes to emerge with respect to why participants started to cycle. Many also mentioned pure enjoyment of the activity and to be healthy which is a consistent theme throughout the study. There was also a desire to be outdoors and to maintain mental health. These findings are the same with those reported in the previous literature examining motivation among competitive and non-competitive cyclists, which, prior to this study, has tended not to not include diverse participants (LaChausse, 2006). However, physical activity research overall has plenty of diversity. These findings indicate that atypical cyclists begin cycling for similar reasons to typical cyclists to socialize and for health reasons (Nettleton & Green, 2014). Thus, providing a better understanding of the importance that ethnic minorities place on socializing with others like oneself and this being a possible area to target in the promotion of cycling within diverse populations.

Most participants were introduced to their cycling club through their social support network, though others independently decided to start to cycle. The intent to be healthier and to socialize with others are recurring themes in questions pertaining to deciding to cycle (both study and literature).

Considering the limited research on why ethnic minorities join cycling clubs, findings demonstrate the influence social support networks can have on ethnic minorities' participation in cycling. In the study conducted by Courneya, Plotnikoff, Hotz, and Birkett (2000) findings showed that social support is a strong indicator of how people regard their intention to become physically active and staying active. Participants were consistent with other findings many commenting that cyclists join cycling clubs to meet people like them, with most participants making comments along the lines that they longed for camaraderie, a deeper social connection among people who perform the same activity. There is minimal research on why ethnic minorities decide to join a cycling club these findings highlight how pivotal the desire for social connections is within ethnic minorities. Participants repeatedly reported the need to observe someone like them being active

can cause more ethnic minorities in diverse communities to become active if they were seen cycling in these communities.

Continuing the theme of social motives, networks, and norms, family and friends were found to be an important influence on the participants' participation in cycling. Most of the responses stated how supportive and helpful their social network is during cycling events. The support was to the point of driving to various locations to provide food and equipment when needed in competition stops. There was also a consensus among participants stating how cycling in a positive manner is impacting their relationships. These findings again illustrate what Gibbison and Johnson (2011) found that ethnic minorities who have a social support network that is highly supportive are more likely to have high levels of physical activity than those who lack the support. This can be used as a foundation to have future research interventions that incorporate skills so ethnic minorities develop strong social supports to start and maintain this form of physical activity.

Participants agreed characterizing the stereotypical cyclist an affluent white male. Other characteristics that typified a stereotypical cyclist were that they tend to be healthier or dealing with a health condition. However, some participants stated that they did not find any stereotypical cyclist within the cycling community. Findings support previous literature on characteristics of a stereotypical cyclist and provide new insight into the stereotypical cyclist from the perspective of atypical cyclists (Steinbach, Green, Datta & Edwards, 2011). These findings will help to add to the literature on differences diverse populations may perceive on a stereotypical cyclist.

Participants expressed the barriers to cycling in ethnically diverse communities, which included the lack of visibility of atypical cyclists and poor infrastructure. Some of the suggestions to overcoming the visibility barrier included having atypical cyclists' cycle in these diverse communities. This coincides with previous research that states that visibility is important to get more ethnic minorities to be active (Steinbach, Green, Datta, & Edwards, 2011). Future research interventions should consider incorporating rides in which atypical cyclist cycle in diverse communities to promote cycling in diverse populations. Inclusivity, through the provision of rides for all abilities and ages, emerged as a common theme in relation to how the characteristics of a stereotypical cyclist could be broken down. Some participants stated that they cycle to breakdown views of the stereotypical cyclist in the hope to let those like them know that cycling is a viable option. This is congruent with aspects of self-efficacy the vicarious experience in which seeing another individual perform an activity can give confidence to the individual observing to perform the activity (Bandura, 1977).

Limitations and future research recommendations

The limitations of this study included a small volunteer sample, incomplete responses, and directly sending the survey to the cycling clubs across different geographical areas could skew results due to different environments. Future researchers should consider recruiting a larger sample size that can encompass people from various diverse backgrounds and geographical areas. A larger sample size would also allow for the opportunity to examine differences in participants based on ethnic background and/or geographical area. It may also be worth considering adopting a mix-methods approach that incorporates previously validated scales to assess aspects such as cycling motives and barriers.

Conclusion

This study has provided insights on perceptions that ethnic minorities have about the cycling community. The purpose of the study was to understand how these atypical cyclists have broken the norm in the cycling community with the aim to learn how to get more members of various communities active. This study provides a foundation for possible interventions and policies needed to promote this form of active lifestyle as described above. The main correlations why participants decided to cycle stated in this discussion can lead to the development of interventions and programs that emphasize what participants stated to promote this form of active lifestyle in diverse communities.

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Exploring Empathy as a Mediating factor for the Racial Disparities in the Criminal Justice System

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Kenya Broadus, McNair Scholar, The Pennsylvania State University

McNair Faculty Research Adviser: Jose Soto, Ph. D.
Sherwin Early Career Professor in the Rock Ethics Institute and Associate
Professor of Psychology
Department of Psychology
College of the Liberal Arts
The Pennsylvania State University

Abstract

Racial disparities in the American criminal justice system are pervasive. One blatant example is the unequal sentencing seen among White and Black defendants. On average, Black defendants receive longer jail sentences than White peers who commit similar crimes. This study examined whether the racial disparities observed in jail sentencing could be replicated in a lay sample and whether differential motivation to engage in empathy with racial outgroup members could explain the differences in sentencing. Previous literature suggests that White individuals do not extend the same amount of empathy to Black individuals than they do to White individuals. Using the Empathy Selection Task (EST) developed by Cameron et al. (2007) we asked 40 participants to either describe or empathize with 46 photos of men found guilty of a crime and then asked participants to rate the severity of the crime and choose an appropriate jail sentence. We varied the race of the target picture between Black, White, and Other. Results showed that participants endorsed a harsher punishment when the target was Black and when they chose to describe the target rather than empathize with the target, after controlling for perceived severity. However, the race of the target did not predict participants decision to empathize versus describe the target individual, thus precluding our testing of empathy choice as a mediating factor in punishment disparities. The findings in this study provide promising pilot data to be expanded on in the future as it replicates an important disparity in our justice system and reveals empathy choice as a possible factor in mitigating these disparities.

Introduction

Governor Tom Wolf of Pennsylvania put a temporary hold on the death penalty in 2015, releasing the following statement for his reasoning behind the decision: "This moratorium is in no way an expression of sympathy for the guilty on death row, all of whom have been convicted of committing heinous crimes. This decision is based on a flawed system that has been proven to be ineffective, unjust and expensive" (Turner, Urban, & Bramila, 2015). Governor Tom Wolf's statement decision and statement recognize the rampant inequality within our justice system. There is a clear disparity in the penal system wherein Blacks are punished more harshly than their White counterparts, often for the same or similar crimes.

A logical assumption is that racial biases are likely at play to explain these racial disparities. However, aside from the inequitable outcomes, it is not clear how racial biases might be playing out in the criminal justice system to produce these disparities. We are looking at empathy as a possible mediating factor to explain this disparity.

We chose to examine empathy based on previous work that has demonstrated differential tendencies to empathize with ingroup versus outgroup members. Particularly, several studies have been conducted that shown either a lack of motivation among White individuals to empathize with Black individuals or reduced empathic ability in these cross-race empathic circumstances. Thus, in the present study we tested whether empathy may be a significant factor that contributes to the racial disparity in punishment that is observed in the criminal justice system.

Justice System Inequalities

The justice system inequalities between Black and Whites is evident in several different statistics. For instance, Petit and Western (2004) looked at the chances that a man will be incarcerated by the age of 30. The chance of incarceration was 3% for Whites, as compared to 20% for Blacks. If we lived in a society that had a fair legal system, then White and Black men should have the same opportunity for freedom. The more than six-fold difference in likelihood of imprisonment between Black and White men is a reminder that our system is not fair.

The injustice that we see in the legal system is evident at all levels, from rates of incarceration to sentencing to death row executions. For example, Blacks are more likely to be sentenced to death row, the most extreme punishment that a state can give. In Pennsylvania alone, out of the 1,476 people that have been executed since 1976, 507 were Black (Deathpenaltyinfo.org, 2018). Black individuals also constituted 34.3% of all executions in Pennsylvania, despite making up only 11.8 percent of the population (census.gov, 2017).

The trend in Pennsylvania of Black individuals making up a small percentage of the population but constituting a disproportionate amount of death row convictions mirrors a continued trend that we see across the United States. Baldus, Pulaski, and Woodworth (1983) conducted a study that made use of death row sentencing data from the state of Georgia during the 1980s. Analysis of death row convictions showed that the race of the perpetrator (and race of the victim) had a significant influence on whether an individual found guilty of murder would be sentenced to death. In cases where there was a Black defendant and a White victim, the death penalty was assessed 22% of the time. In contrast, when the defendant was White, and the victim was White, the death penalty was assessed 8% of the time. In cases where the victim was Black, the death penalty was assessed much less frequently (3% for White perpetrators and 1% for Black perpetrators). These data would later be used in a Supreme Court case to argue that our justice system was biased in sentencing decisions (Gross,2013). The Baldus study reveals a striking disparity between how the lives of Black and White individuals are valued within the justice system and, more likely, society at large. The evidence suggests that the American legal system disproportionally places Black men (relative to White men) on death row, but this discrepancy is even more striking when the victim is White than when the victim is Black.

This racial disparity can even be seen past the sentencing phase and into the final stage of execution. Jacobs et al., conducted a study in 2007 that examined how many individuals that were sentenced to death row wound up being executed by the state, and what factors predicted who would eventually be executed. Overall, they found that less than 10% of individuals sentenced to death were executed and that multiple factors predict whether someone will be executed or not. After controlling for several individual and contextual factors, however, race remained a significant predictor of execution, with Black men being executed more than White men. This is yet another example of how society places a lesser value on the lives of Black individuals in relation to White individuals. In the next section, we explore how empathy may be one of the reasons why we see these pervasive disparities.

Empathy as a Mechanism for Justice System Inequality

Empathy is a concept that incorporates many different dimensions. It has a moral, cognitive, emotional and behavioral component. When someone empathizes with another person they can understand someone's situation, perspective, and feelings (Benbassat et al., 2004). Being able to empathize with someone allows you to connect to that person and make you want to help. Empathy is also related to prosocial behaviors (McMahon et al., 2005). But previous literature shows that who we choose to empathize with matters, suggesting that we do not always extend the same amount of empathy to everyone.

Empathy for Ingroup vs Outgroup Members

Whether or not someone demonstrates empathy toward a target can be affected by whether targets are characterized as ingroup or outgroup members. Group membership can be based on any number of factors such as sex, age, and ethnicity (Krauss Whitbourne, 2010). There are many consequences to labeling someone as an outgroup member. Hein et al. (2010), for example, demonstrated that participants can show a lack of empathy towards outgroup members, even for arbitrary social outgroups, such as when asked to empathize with a fan from a rival team.

We also see that there may be less empathy for individuals from different races. In fact, Forgiarini, Galluci, and Maravita (2011) demonstrate that there is a lack of empathy in White individuals to empathize with a Black individual's physical pain, and this lack of empathy is correlated to implicit racial biases. There is biologically based evidence that suggests that who we are trying to empathize can affect how we vicariously experience the emotions of others. Sirigu and Agiloti (2010), for example, found that when participants observed the pain of an in-group confederate the participant's corticospinal system responded as if they had been experiencing the pain themselves. However, they only showed this response while looking at White confederates and failed to show this vicarious mapping of pain while they observed individuals that were outgroup members (based on skin color).

One possible reason why we may not extend empathy towards outgroup members is that we see some outgroup members as less than human. Research by Vaes, Paladino, and Leyans (2006) demonstrates that people are less willing to attribute emotions such as jealousy, sympathy, or hope to outgroup members, and attribute those emotions more readily to ingroup members. Extending these "secondary emotions" to individuals can increase altruism and empathy. By extending secondary emotions to ingroup members we humanize them more and, by extension, dehumanize outgroup members when we deny them these emotional experiences.

The dehumanization of outgroup members has been used throughout history to justify heinous acts committed against individuals such as slavery, genocides, and the holocaust. This can possibly explain why ingroup members may have a difficult time empathizing with outgroup members, and in turn, be more willing to punish Black individuals more harshly.

Empathy and Punishment

African Americans have long suffered from being less of a person than their White peers. This dehumanization of African Americans can be traced back to the enslavement of Africans, when they were seen more as property than they were as people in the early 1600s. The dehumanization of African Americans did not stop when slavery was abolished in 1865, but continued into the 1800s, with textbooks comparing Blacks to apes and explicitly stating that "Blacks are inferior to Whites" (Gould, 1981, p. 64-66). The association between Blacks and apes (or a less evolved humanoid form) has been engraved in the unconscious of America.

This tendency can also be seen throughout the media. For instance, Lebron "King" James' 2008 Vogue magazine cover in which he is holding a White woman was reminiscent of the 1976 images of King Kong capturing a White woman and climbing to the top of the Empire State Building.

Goff et al. (2008), explored possible consequences of African Americans being compared to apes. Their study looked at how the dehumanization of Black individuals (by associating them with apes) can change perceptions about violence committed against Blacks in a criminal setting. For instance, when White participants were primed with a picture of an ape and then saw a video of a Black man getting assaulted by a police officer, they were more likely to say that it was justified, then when they were primed with a non-ape photo (Goff et al., 2008). These results show that individuals are more willing to look at Blacks as worthier of harsher treatment or punishment based of their implicit association of Blacks with less humanity.

Unfortunately, the tendency to see harsher punishments given to Black individuals is evident at various developmental periods. From an early age, Black children are subjected to harsher punishments. African American children are suspended from schools at much higher rates than any other ethnic group. In one example, African American males made up 43% of the school age population in New Orleans, and constituted 65% of the school's suspensions, and 80% of the expulsions (David and Jordan, 1994). The trend of Black children being punished more harshly than their peers continues even into present times. Skiba et al. (2002), found that African American children were being treated different in relation to their White peers, being sent to the principal's office for infractions that were more subjective in interpretation.

In a criminal, setting there is work that has been done that suggest that Blacks are punished more harshly depending on how many stereotypically Black characteristics they possess. Viglione, Hannin, and DeFina (2011) found that there is even a disparity in jail sentencing among Blacks individuals depending on how dark their skin tone was. Black women that were considered light skin received shorter time behind bars than those that were darker skinned. In another study, Eberhardt et al. (2006), found that when Black defendants were accused of killing a White victim, the more stereotypically Black the defendant was seen, the more likely that person was to be sentenced to death. Black individuals are not only being punished harsher in relation to White individuals, but they are punished harsher than other Black individuals that have less stereotypically Black features. The disparity in harsher punishments given to Black individuals that are perceived as having more stereotypically Black features point to the idea, that being Black itself, is enough justification for harsher punishments. So the "Blacker" you are, the harsher punishment you deserve.

Overall, there is good evidence that the severity of punishments doled out in society varies by race, with Black individuals tending to receive harsher punishment than their White peers. Based on the literature it appears there is also a lack of empathy given to outgroup members, and this lack of empathy appears stronger when considering White individuals being asked to empathize with Black individuals.

The Present Study

While the above work provides an indication of how Black individuals may be responded to by Whites in non-criminal circumstances, there is less work done on how empathy can play a role in how individuals respond to antisocial and criminal behavior. In general people may be less likely to empathize with criminals or disengage with them, but the level of disengagement may not be the same across race as evidenced by the literature reviewed above.

In the present study, we will examine whether a lack of empathy for perceived racial outgroup members could contribute to racial disparities in suggested lengths of punishments of Black and White individuals found guilty of crimes. We will test this theory by having participants look at various photos of individuals (varying in race from Black, White, and Other) in distress (crying, sad) to provoke an empathetic response. We will couple the photo with a short vignette that describes that the person was found guilty of a crime. We will give participants a behavioral measure of empathy (the Empathy Selection Task) to see if the motivation to empathize with a given target varies by race. Then we ask participants to suggest a punishment (suggesting a jail sentence) for the target individual. We expect to find that participants will give harsher punishments (longer jail sentence) to the Black targets in the photos compared to White targets. We also expect to find that the race of the target would predict how much participants choose to empathize with the target, where participants will choose to empathize with Black targets less than they do White and other Targets. And finally, we expect to find that the relationship between target race and punishment will be mediated by differences in participants willingness to engage in empathy for Black and White targets.

Methods

Participants

Potential participants were recruited for this study using Amazon's Mechanical Turk services (www.mturk.com). First, a brief screener survey was made available to MTurk workers to identify participants who met the eligibility criteria for our study (being over 18 and being born in the United States). One hundred fifty MTurk workers were paid $.03 for completing the screener survey to determine if they were eligible for the survey. Those meeting the criteria were then invited to complete the experimental survey. A total of 40 MTurk workers completed the experimental survey. We excluded 3 participants from the final set of analysis because two were not born in the United States, and one did not complete the entire survey. Of the 37 that were included in the data analysis, 19 were females and 18 were males. In terms of race, 70.3% of our participants were White, 13.5% Black, 8.1% Latino, and 8.1% multiracial. The mean of age was 35.49 years and participant's ages ranged from 22 years old to 53 years old. The mean political orientation score for all participants was 3.24 out of 7, and approximately 75% of the sample indicated that they were politically moderate or liberal to some extent, indicating that our sample consisted mostly of non-conservatives. Participants were compensated seven dollars for completion of the study.

Materials

This study made use of Amazon.com Mechanical Turk (MTurk), which is an online platform that is used to collect data from a sample of diverse adults who are comparably attentive to student laboratory samples and provide psychometrically reliable responses (Burmester, Kwang, & Gosling, 2011; Hauser & Schwarz, 2016). The study was administered via an online survey using Qualtrics software to create and distribute the survey. The survey consisted of two main parts: The Empathy Selection Task and demographic questions.

Modified Empathy Selection Task (EST). The Empathy Selection Task is a multi-trial decision task developed by Cameron et al. (2007). On each trial of the EST, participants are presented with a picture of a distressed individual (e.g., person crying). Participants are then asked to either empathize with ("feel empathy for the individual on the image and write about that individual's internal feelings and experiences") or describe the target in the photo ("remain objective and write about that individual's physical details such as hair, age, etc."). They are then asked to enter three keywords that reflect either their Feel or Describe selection.

For the purposes of the present study, the stimuli and trial structure were modified as follows. First, the target pictures were always of a distressed man. Second, the pictures were always coupled with short vignettes about how the target has been found guilty of a crime. Third, participants were asked to rate how serious/severe they thought the crime in the vignette on a 1-5 scale (1=not serious/severe at all; 5=one of the most severe/serious crime that you can commit). Fourth, participants were then asked to suggest a punishment for the target after being provided with the typical amount of jail time associated with the crime in the vignette. A 7 point-scale was then provided which ranged from below the typical minimum sentence (1) to more than the typical jail sentence (7), with the remaining 5 points (2-6) of the scale being evenly divided among the typical jail term for the crimes. In all, participants were shown 20 photos of White targets, 20 photos of Black targets, and 6 photos of targets of other races (as distractor trials) for a total of 46 trials.

The crimes presented in the vignettes were divided into two major categories, those resulting in injury (attempted murder and assault) to those resulting in death (first degree murder, second degree murder, manslaughter). Those two categories were further broken down to include five different types of crime: first degree murder, second degree murder, manslaughter, attempted murder and assault. There was an approximately equal amount of Black and White race photos across each type of crime. For first degree Murder there were 4 White Target photos, 4 Black target photos, and 2 Other race target photos. For second degree murder there was 1 White target photo, 3 Black target photos, and 1 Other race target photo. For aggravated assault there were 5 white target photos, 4 Black target photos, and 1 Other race target photo. For attempted murder there were 7 White target photos, 5 Black target photos, and 1 Other race photo. Finally, for manslaughter there were 7 White target photos, 5 Black target photos, and 1 Other race target photos. We used a within subject design for all 37 of our participants.

Demographics. After participants completed all 46 trials they were prompted to answer questions about their demographics (e.g., where they are from, their political leaning from liberal to conservative, how old they are).

Additional Measures. Lastly, participants also completed the Color-Blind Racial Attitude Scale (CoBRAS: Neville et al., 2000). The CoBRAS has a total of 20 items and captures the extent to which someone denies or minimizes the existence of institutionalized racism. We included this measure for future analyses and did not make use of this scale for the present study.

Procedures. The study was completed online and was conducted wherever the participants chose to take it. Before the survey was given participants filled out a consent form online. The first part of the study consisted of participants completing the modified Empathy Selection Task, followed by the demographics question, and then the CoBRAs scale. A debriefing was provided after the survey explaining the purpose of the study and reviewing that the individuals depicted in the photos were not actually accused of crimes.

Results

Data Analytic Approach

Our study design made use of a within-subjects approach, allowing us to obtain greater statistical power by essentially examining the relationship between our variables of interest across multiple trials (46) for each participant. Thus, across our 37 participants there were a total of 1702 instances where participants made empathy/describe decisions and provided ratings of crime severity and punishment. However, we were primarily interested in the data from the trails with Black and White targets and therefore removed the 222 trials with other race targets (6 trials x 37 participants) for our analyses. All analyses were conducted using the Mixed Linear Models (MLM) Procedures in IBM SPSS v 25). In each case, subjects were treated as a random effect and the intercept for the random effect was specified in the model. The Maximum Likelihood (ML) method was used to estimate the model. Given that we would expect the punishment to vary based on participant perceptions of how serious or severe they rated the crime presented with each target picture, we entered crime severity ratings as a covariate in all models with punishment ratings as the dependent variable. Below we provide the fixed effects and dependent variables specified in each model discussed.

Primary Analyses

Our first hypothesis was that participants would be more likely to endorse greater punishment (higher sentences) when the target was Black in relation to when the target was White. To test this using MLM, we specified target race (Black or White) as the fixed effect in our model, crime severity as a covariate and punishment ratings as the dependent variable, in addition to the random effects specified above. Results revealed a significant effect of crime severity, as expected, $F(1, 1417) = 808.8$, $p < .001$ The effect of Target Race on punishment was also significant, $F(1, 1405) = 3.72$, $p = .05$. An examination of the mean punishment ratings reveals that Black targets were punished slightly more harshly ($M = 3.79$) than White targets ($M = 3.64$), even after controlling for crime severity.

Our second hypothesis was that the race of the target would predict participants' likelihood of choosing to feel (empathy) or describe. To test this using MLM we specified race of the target (Black or White) as the fixed effect in our model, crime severity as a covariate, and choice as our dependent variable. Target race was not related to choose, $F(1, 1391) = 1.22$, $p = .269$. An examination of the means revealed that participants were choosing to describe vs. empathy at roughly equal rates for White targets ($M = .493$) and Black targets ($M = .518$).

Our third hypothesis was that the relationship between target race and punishment would be mediated by differences in the likelihood of selecting empathy vs describe (empathy choice) for Black vs White targets. However, since target race was not significantly related to empathy choice, this hypothesis was not supported. Nevertheless, we were interested in whether empathy choice was related to punishment and tested this using another MLM model where empathy choice (describe vs feel) was the fixed effect in our model, crime severity a covariate, and punishment our dependent variable. Empathy choice significantly predicted punishment $F(1, 1417) = 13.06$, $p < .001$. An examination of the means revealed that when participants chose to describe they endorsed harsher punishments ($M = 3.87$) than when they choose to feel ($M = 3.56$).

Discussion

There is a clear racial disparity in the US criminal justice system wherein Black individuals are punished more harshly than White individuals. We were interested in finding out why this disparity exists, examining whether empathy may be a mediating factor to explain differences in punishment by race. We suspected that individuals may choose to avoid empathy with Black targets more than with White individuals and that this difference may be responsible for why we see Black individuals sentenced to jail more often, sentenced to longer time in jail, sentenced to death row more frequently, and executed at higher rates than their White peers. Our results showed that participants did, in fact, endorse harsher punishments for Black individuals relative to White individuals. We also found that choosing to describe (vs. feel) was also related to harsher punishment assigned to the targets. However, race of the target was not significantly related to empathy choice, therefore we were unable to fully test if empathy choice was a mediating factor in the decision to punish more harshly.

Predictors of Punishment

In our analyses, we found that target race significantly predicted participants' endorsement of harsher punishments. This finding is consistent with previous literature showing that in a noncriminal setting, Black individuals are punished more harshly than their White peers (Davis & Jordan, 1994; Patit & Western, 2004). This pervasive difference may be due to the media portrayal of Blacks as criminal and inherently violent, which may lead individuals to form implicit biases towards Blacks. The result of possessing these biases may be led to the racial disparities observed in the criminal justice system. For instance, lawyers may be more likely to believe that Black defendants are guilty, and that they are more deserving of a harsher punishment. This could lead to lawyers seeking out longer sentences.

We also found that the race of the target was not significantly predictive of whether participants chose to describe or feel, contrary to our expectations. This lack of a difference might have been driven by participants going out of their way to try to empathize with Black targets because they see this group as potentially needing more support or advocacy. For example, Byrd, Hall, Roberts, & Soto 2015) demonstrated a "bend-over-backwards effect" where White non-conservative was less likely to discriminate against Black individuals, when race was apparent in a situation. They may even discriminate in favor of Black individuals in those situations despite still having an implicit racist bias towards Blacks. In our study, it is possible that participants perceived that the study was about race and attempted to provide answers that would make them look less biased. The fact that our sample leaned liberal suggest that the same phenomenon may have been at play in our data, especially considering that the targets were predominantly Black and White which may have easily raised concerns that race was a variable of interest in this study.

Lastly, we found that when participants chose to empathize with the Target they suggested a less severe punishment. This makes sense based on literature that suggests that having empathy for someone allows you to understand that person and their feelings and prosocial behavior (McMahon et al., 2005). Once you can understand what someone is feeling you are more prone to want to help them. It is possible that when participants chose to empathize with a target (instead of describing them) that they became more motivated to help the target. In this context, that help or prosocial behavior may have been suggesting a shorter jail sentence. This may be one of the reasons why we see less harsh punishments for targets that participants chose to empathize with. It is also possible that empathizing with the targets led participants to attribute more secondary emotions to the targets.

The depictions of distress and grief in the stimuli chosen for the present study were likely interpreted as secondary or complex emotions (e.g., grief, regret, anguish, etc.), which has also been associated with greater humanizing of a target and more altruism behavior displayed toward that target (Vaes et al. 2006).

Limitations and Future Directions

One weakness of our study was the small sample size. Unfortunately, we had limited funds to pay participants, but future data collection efforts will make use of subject pool participants which will allow for much larger sample sizes to test our hypotheses. Another limitation of our study is that variability its ages of the targets in the photos. This variability could have affected participants' choice to empathize or not if, for example, participants felt that younger targets were more deserving of empathy. Future work should control better for the age of the targets. Lastly, the pictures in our study may have been too emotionally evocative given their clearly distressed expressions. This might have made it difficult for people to choose to describe over empathy because the emotion in the pictures may have been more compelling. Thus, while individuals may tend to avoid empathy because it is more effortful or cognitively costly (Cameron et al. 2017), our stimuli may have counteracted this tendency enough to even out the likelihood of our participants choosing to describe over empathy.

Conclusion

Though not all our hypotheses were supported there are important implications that we can pull from this research. Black individuals were given a harsher punishment in a criminal setting, which adds to the literature demonstrating a racial disparity paralleling the patterns observed in the criminal justice system. These findings also suggest that when an individual expresses empathy for an individual they are more lenient in punishment. Empathy is a learned skill and one day there can possibly be a training video or class given to individuals to increase their willingness to empathize with Black defendants, in hopes that this will mitigate the racial disparities that we see in the criminal justice system.

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Examining Differences in Stress-Based Factors Between First-Generation and Continuing-Generation Doctoral Students

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Elliot X. Bruce, McNair Scholar, The Pennsylvania State University

McNair Faculty Research Advisers:
Jonathan Cook, Ph.D.
Assistant Professor of Psychology

Peter M. Ruberton, Ph.D.
Postdoctoral Scholar
Department of Psychology
College of the Liberal Arts
The Pennsylvania State University

Abstract

      For college students, research suggests that being a first-generation student (i.e., someone whose family has not previously attended college) can make achieving an undergraduate degree more difficult. To achieve a graduate degree, more specifically a Ph.D., the journey for first-generation students may be even harder. First-generation graduate students may be more prone to specific stressors and difficulties in schooling than their continuing-generation counterparts. Continuing generation students likely also experience typical stress but to a lesser extent than first generation students. The current study focused on identifying whether any differences emerge in stress-based factors between first-generation and continuing-generation doctoral students**.** Contrary to my hypotheses, the results of the study generally did not reveal significant differences among student generation groups in stress-based factors. Further research is necessary to uncover why differences between student-generational groups among graduate students are not as apparent as differences among undergraduates.

Introduction

      For individuals who decide to attend graduate school, the life of a graduate student can be very challenging. This journey is full of many ups and downs that can affect a student when striving to complete a doctoral degree. These "ups and downs" can be also be particularly impactful to a student's mental state as a first-generation student in a graduate program in science, technology, engineering, and math (STEM), which in turn can lead to students withdrawing from their Ph.D. program. This is due to complex difficulties and stressors that first-generation students may have to deal with more than continuing-generation students. Within STEM major fields and other disciplines, competition as well as pressure from academic work can be overwhelming for some students. Continuing generation students may not experience these same stressors the same way as first-generation students. As a result, first generation students may have greater stress than continuing generation students.

In comparison to first-generation students, continuing generation students have parents who have completed and earned a degree at either an undergraduate level or at a graduate level. As a result, these students tend to be more advantaged financially and even psychologically, than first-generation students. Social class tends to correlate to parental education within society, which is notable since, in comparison to continuing-generation students, first-generation students tend to come from working class families. (Harackiewicz et al., 2014). This means that it is more likely for first-generation students to have fewer positive role models in a position in which they see themselves in in the future. Additionally, first-generation students are typically older and from lower socioeconomic backgrounds than continuing-generation students, and they typically receive post-secondary degrees at lower rates than their continuing generation counterparts (Nunez & Carroll, 1998).

Some first-generation graduate students may feel more secluded or experience a culture shock in their Ph.D. program because of not having immediate family with higher education experience. Higher education is an environment that is reflective of the middle class, a status that many first-generation students may not have experienced until they have reached the undergraduate level of schooling (Herrmann & Varnum, 2018). This novel climate in turn can lead to issues with identity conflict which can also add another dimension of stress and complexity to the experiences of first-generation students.

In addition to the stressors of a novel academic environment, finances can be also be an obstacle. First-generation undergraduate students may be under more pressure financially and must do things such as hold a job and work longer hours than a continuing generation student may have to. Although many universities provide doctoral students with financial support (e.g., teaching assistantships), not every student is able to obtain financial support while attempting to balance a life outside of school (for example, if a graduate student had a child to care after). For most graduate students (including students pursuing other degrees besides the Ph.D.), as reported by Collegeboard, loans are a key aspect for paying off their schooling. In the 2016-2017 academic year, 63% of students borrowed money from the federal government; 22% of students received some type of institutional grant from their place of schooling; 9% received money from private and employer grants; and less than 5% received funding from each of federal education tax credits and reductions, state grants, federal grants, federal work-study, and veterans and military grants (Baum, Ma, Pender, & Welch, 2017). Thus, loans are a common part of graduate school life, broadly defined.

When added on top of the loans that a student will amass during their undergraduate student education, first-generation students may end up having to pay back a major bill at the end of their graduate school career. Although FAFSA provides eligible students with grants to offset this financial burden, its reach is limited, as under 5% of graduate students use FAFSA grants. Moreover, these grants generally do not fully cover the costs of undergraduate and graduate school, given the program's relatively small budget, which amounts to about two million dollars per year in federal funding nationwide for students (Baum et al., 2017). First-generation students may have relatively less of a financial backing from families, so having a safety net is most likely not an option outside of university funding. Without proper support systems in place, first-generation students most likely must figure out how to receive funding and income by themselves in addition to completing the work that is expected of them during their Ph.D. program. Thus, first-generation Ph.D. students may begin their doctoral program with a greater debt burden and with greater stress from having to navigate the complexities of the financial system.

Researching first-generation doctoral students provides insight into a group of students who have largely been overlooked. Understanding the specific stressors that affect first-generation graduate students will lead to insights that can ultimately help to improve students' experiences. In academia, it is important to not only consider how students are impacted at an academic level in class or in the lab but through personal factors. Stress can take many forms including what people report about themselves, as well as how much they sleep and exercise, and how much they compare themselves to others (Pilcher & Ott, 1998).

For instance, research has suggested over time that exercise can help to reduce stress in individuals (Rimmele et al., 2007; Nabkasorn et al., 2006). For undergraduate college students, exercise is typically not a routine activity or priority amongst most students as most students tend to spend their time elsewhere (Boyle & LaRose, 2009) (Haberman & Luffy, 1998). When reviewing previous psychological studies, information on the physical activity levels of graduate students seems to be largely unavailable. In relating exercise to graduate students and stress, reviewing the amount of exercise that students participate in is essential because exercise can be used to connect which student generation status groups may or may not be more stressed than the other groups.

Sleep is another factor commonly linked to stress levels. Stress has been suggested to be a cause of sleep disruptions, which, when regarding this study, means it is appropriate to associate lower sleep levels with higher amounts of stress (Åkerstedt, 1987). Stress has also been associated with sleep disorders which also gives further credibility to the connection between each other as stress-based factors (Partinen, 1994). As most research has shown for graduate students, it is difficult to find previous studies that review sleep levels and how that can directly affect college students at the graduate level. Nevertheless, one possibility is that students experiencing more stress may sleep less.

For first-generation students, it is expected that they may be more stressed than their continuing-generation counterparts. First-generation students often come from working-class families to a middle-class research institution, without having academically-oriented social support systems. They must pave the road through higher education themselves. It would be foolish to discount the stress that continuing-generation students may experience as well but in comparison, it appears that first-generation students may experience these stressors more often and with more intensity.

In sum, first-generation students seem to be at a disadvantage in relation to continuing-generation students in undergraduate education, but little research has studied whether such discrepancies also apply to first-generation graduate students. This study examines whether first-generation students experience more stress than their continuing-generation counterparts. Specifically, I look at whether first-generation students may experience more stress, as indicated by self-reported daily stress and from reports of their sleep, exercise, and social comparison.

Method

Participants

Participants for the study were Ph.D. students attending the Pennsylvania State University. Participation in the study was not limited to a specific field but STEM majors were mostly recruited. A total of 131 participants completed a first baseline survey, and 90 of the 131 baseline participants completed a second, smartphone survey phase.

For the baseline survey, the 131 participants were mostly STEM majors with an average age of 27 years old. For the self-identified ethnicity and race demographic, 0.8% of the sample reported being of Native American descent. Asian participants accounted for 28.2% and Black participants accounted for 3.8% of the sample. Latinx participants represented 11.5% and White participants accounted for 61.1%. Mixed race participants made up 1.5% of the sample while only 0.8% identified other as Lur and Filipino in the sample. First-generation students accounted for 24.4% of the sample while continuing-generation graduate students consisted of 42% and continuing-generation undergraduate students consisted of 33.6%.

The primary focus of the research was the 90 participants who completed the smartphone survey. The average age of the smartphone participants was 27 years old. The smartphone sample was almost equally split between men and women (44 male, 46 female). First-generation students accounted for 26.7% of the sample while continuing-generation graduate students consisted of 35.6% and continuing-generation undergraduate students consisted of 37.8%.

For the self-identified ethnicity and race demographic, Native American students represent 0.9% of the sample. Asian participants accounted for 26.7% and Black participants accounted for 4.5% of the sample participants. Latinx participants represented 12.2% and white participants accounted for 46.8%. Mixed race participants made up 1.8% of the sample only 0.9% identified as Lur and Filipino which represented of the sample.

Design

This study was a 1-week correlational field study in which doctoral students were participants. In addition to a web-based baseline survey, participants completed daily smartphone-based surveys that focused on their day-to-day thoughts and feelings over a period of 7 days.

This study examines differences in stress-related variables among three distinct groups of graduate students: First-generation students, continuing-generation undergraduates, and continuing-generation graduate students. First-generation students were students who reported at baseline that they considered themselves to be both first-generation undergraduate and first-generation graduate students. There were two groups of continuing-generation students. Continuing-generation undergraduate students were those who reported being first-generation graduate students but not first-generation undergraduates, whereas continuing-generation graduate students reported being neither first-generation undergraduate nor graduate students.

Procedure

Participants were recruited from various programs across Penn State's Ph.D. programs. With the assistance of the departmental graduate directors and coordinators, emails were sent to students inviting them to complete the baseline survey. Within STEM disciplines, the study was open for participation. The baseline survey assessed participants' academic backgrounds and demographic information, as well as various psychological variables (e.g., social comparison). The baseline survey also asked participants about their interest in participating in the smartphone study on a 10-point scale. Participants who indicated interest of at least 8 out of 10 were invited to participate in the smartphone surveys.

Participants chosen for the smartphone study were sent a second email notifying them of their selection and describing the smartphone study. The email also contained information on how to install MetricWire, the smartphone app used for the daily surveys, as well as how to access the study in MetricWire.

After participants registered for the study, participants completed a survey in which they indicated the approximate times they woke up and went to sleep on a typical day in 1-hour windows ("Before 7am," "8am-9am," etc.). This information was used to schedule the morning smartphone surveys and evening surveys around participants' daily schedules. Specifically, the morning surveys were prompted at the end of the wake-up window of time that was selected by the participant (e.g., if "7am-8am," was chosen, the survey would come at 8 am) and remained active for three hours before the prompt expired. The surveys were prompted two hours before participants' typical bedtimes and remained active for six hours before the survey expired. Finally, participants completed four "activity" surveys at quasi-random times throughout the day. Participants could receive activity surveys beginning two hours after their wake-up time until the evening survey. The activity surveys could randomly come at any point in this window. Activity surveys also could not happen within an hour of each other, allowing for more variability throughout the day and minimizing the possibility of getting two activity surveys near each other. Each activity survey remained active for thirty minutes.

For compensation in participating in the study, participants were given monetary rewards for completing surveys. For completing the baseline survey, participants were given $15.00. Participants who completed their morning surveys and evening surveys were awarded $1.00 for each survey completed every day. Participants who completed the four activity surveys throughout the day were awarded $0.75 for each completed survey. Bonus incentives were also given to participants who completed a certain proportion of the smartphone surveys as well as a web-based survey for the end-of-week survey.

Smartphone Measures

Stress levels. Stress levels were assessed in the morning smartphone surveys using a single-item lab-generated measure ("How stressed do you feel right now?") on a scale from 0 (*Not at all stressed*) to 100 (*Very stressed*). These scores were averaged across the 7 days the study was active for the analysis.

Sleep levels. Sleep levels were assessed every morning during the smartphone surveys. Amount of sleep was measured with the item "Approximately how many hours of sleep did you get last night?" Quality of sleep was reported on a 5-point scale from "Very poor" to "Very good" Sleep hours and sleep quality were both averaged across the 7 days for the sake of the analysis.

Exercise levels. Participants reported the amount of time, in minutes, that they exercised every day during the evening survey of the smartphone survey. The responses were measured through a lab-generated scale in which participants responded to three items, "How many minutes did you spend today doing _____ exercise", with the blanks filled with "Light", "Moderate", and "Vigorous." Participants responded on a sliding scale in which participants could mark a specific number of minutes from 0 to "120 or more."

Baseline Measure

Social Comparison. Social comparison was assessed in the baseline survey. Participants gave responses based on three items: "Thinking about the past week, how often have you compared yourself to others in your field and thought you were doing _____?", with the blank filled with "Better" (i.e., downward social comparison), "Worse" (i.e., upward social

comparison), and "About as Well". Participants reported their answers on a Likert scale from 1 (*Never*) to 5 (*Constantly*).

<div align="center">**Results**</div>

Stress Levels

A one-way ANOVA was conducted to compare the effect of stress levels ($M = 41.41$, $SD = 19.34$) on student generation status. In the analysis of stress, the main effect between the groups was not statistically significant, $F(2,87) = 0.18$, $p = .839$. Although the effect is nonsignificant, it is notable that between the three student groups, the group with the highest reported stress was the first-generation group ($M = 42.65$, $SD = 20.35$), while continuing-generation graduate students ($M = 39.79$, $SD = 17.11$) and continuing-generation undergraduate students ($M = 42.04$, $SD = 21.00$) had somewhat lower levels (see Table 1 and Figure 1). Essentially, these results suggest that there is a nonsignificant effect difference between the three groups of students, but first-generation students still had the highest average reported stress in the study.

Sleep Levels

A one-way ANOVA was conducted to compare the effect of sleep. Sleep levels were measured using two items and so, there are two separate results for amount of sleep ($M = 7.25$, $SD = 0.75$) and sleep quality ($M = 2.64$, $SD = 0.49$). Results were nonsignificant for both sleep quality, $F(2, 87) = 0.34$, $p = .715$, and sleep hours $F(2, 87) = 1.07$, $p = .349$. The group that had the lowest number of hours asleep was the continuing-generation graduate group ($M = 7.12$, $SD = .72$), then the continuing-generation undergraduate group ($M = 7.24$, $SD = 0.66$). Unexpectedly, though again, not significant, the group who had the highest amount of sleep was the first-generation ($M = 7.42$, $SD = 0.90$; see Table 1 and Figure 2).

The groups that had the lowest quality of sleep was the first-generation group ($M = 2.61$, $SD = 0.48$) and continuing-generation undergraduate group ($M = 2.61$, $SD = 0.55$). The group with the highest quality of sleep was the continuing-generation graduate students ($M = 2.70$, $SD = 0.45$; (see Table 1 and Figure 3).

Exercise Levels

A one-way ANOVA was conducted to compare the effect of student generation status on exercise levels. As noted above, exercise levels were measured (in minutes) with three separate variables: light exercise ($M = 33.37$, $SD = 22.89$), moderate exercise ($M = 11.34$, $SD = 15.022$), and vigorous exercise ($M = 7.83$, $SD = 12.69$). Regarding light exercise, the comparison of generation groups turned out to be nonsignificant, $F(2,87) = 0.96$, $p = .389$. First-generation reported the least amount of light exercise ($M = 28.11$, $SD = 22.87$). Continuing-generation graduate ($M = 34.04$, $SD = 18.348$) and continuing-generation undergraduate groups ($M = 36.46$, $SD = 26.495$) both reported lighter exercise than first-generation.

Regarding moderate exercise, results were marginally significant, $F(2,87) = 2.40$ $p = .097$. Continuing-generation undergraduate students ($M = 7.51$, $SD = 9.86$) had the lowest levels of moderate exercise in comparison to first-generation students ($M = 11.22$, $SD = 20.61$) and continuing-generation graduate students ($M = 15.49$, $SD = 13.98$).

Regarding the last aspect of exercise levels, vigorous exercise, it was not statistically significant, $F (2,87) = 1.23$, $p = .297$. First-generation students ($M = 5.18$, $SD = 10.61$) had the lowest scores across all three groups. Continuing-generation graduate students ($M = 10.42$, $SD = 13.63$) had the highest scores while continuing-generation undergraduate students ($M = 7.26$, $SD = 13.026$) were the middle group (see Table 1 and Figure 4).

Social Comparison

A one-way ANOVA was conducted to compare how participants view themselves between student generation status. Upward social comparison was the only measure analyzed for the results ($M = 2.90$, $SD = 1.15$). As a reminder, higher scores on this variable indicate that participants more frequently compared themselves to others and felt that they were doing worse. Results revealed a statistically significant difference in upward comparisons between groups, $F (2,128) = 4.23$, $p = .017$. The group that compared themselves as worse than others in their field the least was first-generation students ($M = 2.75$, $SD = 1.01$), followed by continuing-generation graduate students ($M = 3.09$, $SD = 1.12$). The group that compared themselves as worse than others in their field the most was continuing-generation undergraduate students ($M = 3.11$, $SD = 1.01$; see Table 1 and Figure 5).

<div align="center">

Discussion

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In the past, research has shown considerable differences in first-generation status compared to continuing generations in performance and other variables at an undergraduate level. However, in contrast with my hypothesis, these differences did not appear in stress-related variables among graduate students in this study. Instead, students across all student generational groups had comparable levels of stress-based factors. Students attending graduate school may be uniquely different in the way they experience and, possibly more importantly, cope with stress. Overall, results did not suggest overly high levels of stress, as the mean of the self-report of stress was below the scale midpoint and participants seemed to be getting typical amounts of sleep.

Self-reported stress levels and sleep levels both emerged as showing no differences among graduate students of different generational status. First-generation students showed higher overall stress levels as well as the lowest overall quality of sleep, but the differences were not as apparent as previously thought to be. This may be because across all student generational groups, regardless of which group, the experiences of working as a graduate student is overall stressful. It is my belief that being in a research institution for graduate school—in the case of this study, The Pennsylvania State Graduate School—has significance into why these differences between groups were not apparent. It is my belief that for students to attend graduate school, specifically a school that is known for its intense and prestigious work such as Penn State, stress-based factor differences in generational status become less apparent due to having to possess characteristics of determinism and grit (Duckworth, 2016) to be successful in graduate school.

Light exercise and vigorous exercise both showed no significant differences between the student generational groups, although interestingly, first-generation students had the lowest levels of both. Moderate exercise was the only variable in the collection of the exercise data that suggested marginal significance between groups. Continuing-generation graduate students reported the most vigorous exercise, while first-generation students reported the least. Taken together, first-generation students reported the least amount of every type of exercise, although not always by a significant margin.

Nevertheless, when viewing exercise as a function of stress, first-generation students did partially support my hypothesis for exercise and, to the extent that exercise reduces daily stress, may thus operate with more stress on a daily basis than continuing generation students. Additional research may be needed to uncover whether this is a reliable pattern.

Although social comparison was not a primary focus of the study but in the collection of stress-based data it was the only variable in the study that suggested statistical significance between student generational groups. In my analyses, I focused on upwards social comparison, which was defined as when people compare themselves to people who are doing better than them and feel worse about themselves. I found that continuing generation undergraduate students engaged in the most upward social comparisons, whereas first-generation students engaged in the least amount. It is my belief that this topic is worth considering again for the sake of research into the different student generational groups in graduate school. This may be important because it can lead to insight into how the perception of others can or, in the case of this study, not affect overall stress levels in graduate students. Regarding why the continuing-generation group may experience this social comparison more than the other groups, that is a topic worth further research. On the topic of why the first-generation students compare themselves less than the other groups, it is also my belief that this is due to having constant pressure to succeed within themselves. I believe that self-motivation is such an essential aspect of their academic journey as students that there is not much value in comparing themselves to others in their field of study. First-generation students may be more prone to these comparisons before entering graduate school, but I believe by the time first-generation students enter graduate school, their confidence and grit within themselves does not allow for these comparisons among classmates as often.

It is important to answer the question as to why these student generational groups did not show many differences between them. However, it is important to shed light on the fact that even though most of these results did not show to be statistically significant, they do support my hypothesis to an extent. First-generation students reported higher levels of stress, lower levels of light and vigorous exercise, and the lowest levels of sleep quality between the student generational groups. My findings show that student generational groups have similar levels of stress-based factors, but what is it about first-generation students that makes it possible to continue their path to achieving a Ph. D., as students, regardless of the stressors in their lives? With that in mind, it may be worth conducting future research that investigates the resiliency and/or the coping strategies of graduate students.

Limitations

The choice of gathering students from Penn State could be a unique limitation in this research. As Penn State's Graduate School is such an intensive and prestigious institution, students from this school may not be representative of other Ph.D. granting institutions. This may be why differences in student generational status probably do not matter as much for Penn State students: because these students are naturally high-academic achieving individuals. Because of this, stress-based level differences may be diminished between the student generational groups as opposed to students who attend another university for graduate school that may be less competitive. The number of participants was also a key limitation in the aspect of this research. There were only 131 participants who completed the baseline survey, and that number was narrowed down even further to 90 participants for the smartphone phase of the study. A sample with more participants could lead to more accurate results, because the limited number of participants available for the study limits confidence in the findings.

With this is mind, it is more difficult to be sure that my findings are accurate. It may also be noted that for participants who are in an isolated college town such as State College, Pennsylvania, the responses could differ from participants who attended a school in an urban setting such as Temple University in Philadelphia, PA.

Another limitation is the amount of time used to survey these participants, which was only one week. For a study focusing on stress-related variables, only capturing self-reported stress levels for a week can be limiting because seven days is a relatively short time to survey. If the survey had lasted for a longer period—for example, a month— there likely would have been high variability between weeks. Essentially, this means that data could come out more accurate if the study were completed over a longer period instead of having the time for survey responses limited to only a week. It is also noteworthy that this survey was conducted in April, around the end of the school semester, which is around the time of finals. A few participants noted not being happy with the timing of the study due to how busy they were during this week of school.

Another limitation could be in the inclusion of mostly STEM Ph.D. program participants into the study. There may also be differences in the way that STEM students process stress and address coping strategies, as opposed to how students in majors relating to business, communications, etc., would deal with stress.

Conclusion

First-generation students are a very specific but prominent group of students within higher education. Previous research has shown differences between first-generation and continuing-generation undergraduate students. By contrast, differences in stress-based factors at the graduate level seem to be relatively less across student generational status groups. These results may be because of uniquely high levels of determination and grit among graduate students. This research has shown that there may be more variables in play when understanding differences in stress-based factors between these student generational groups than previously thought.

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TABLE 1: STRESS BASED FACTORS AS FUNCTIONS OF STUDENT GENERATION STATUS

VARIABLES	n	1G M(SD)	2G M(SD)	2U M(SD)	p
STRESS LEVELS	90	42.65(20.35)	39.79(17.11)	42.04(21.00)	.841
SLEEP HOURS	90	7.42(0.903)	7.12(0.715)	7.24(0.661)	.349
SLEEP QUALITY	90	2.16(0.447)	2.70(0.448)	2.61(0.550)	.715
LIGHT EXERCISE	90	28.11(22.87)	34.04(18.35)	36.46(26.50)	.389
MODERATE EXERCISE	90	11.22(20.61)	15.49(13.98)	7.51(9.86)	.097
VIGOROUS EXERCISE	90	5.18(10.61)	10.42(13.63)	7.26(13.03)	.297
SOCIAL COMPARISON	131	3.09(1.118)	3.11(1.113)	2.75(1.014)	.017

Legend:

FG = First-Generation Graduate Students
2G = Continuing-Generation Graduate Students
2UG = Continuing-Generation Undergraduate Students

Figure 1: Stress as a Function of Student Generation Status

Stress Levels (y-axis, 0–100)

- First Generation Students: 42.65
- Cont. Generation Undergraduate Students: 42.04
- Cont. Generation Graduate Students: 39.79

Figure 2: Sleep Quality as a Function of Student Generation Status

Sleep Quality (y-axis, 0–3)

- First Generation Students: 2.61
- Cont. Generation Undergraduate Students: 2.61
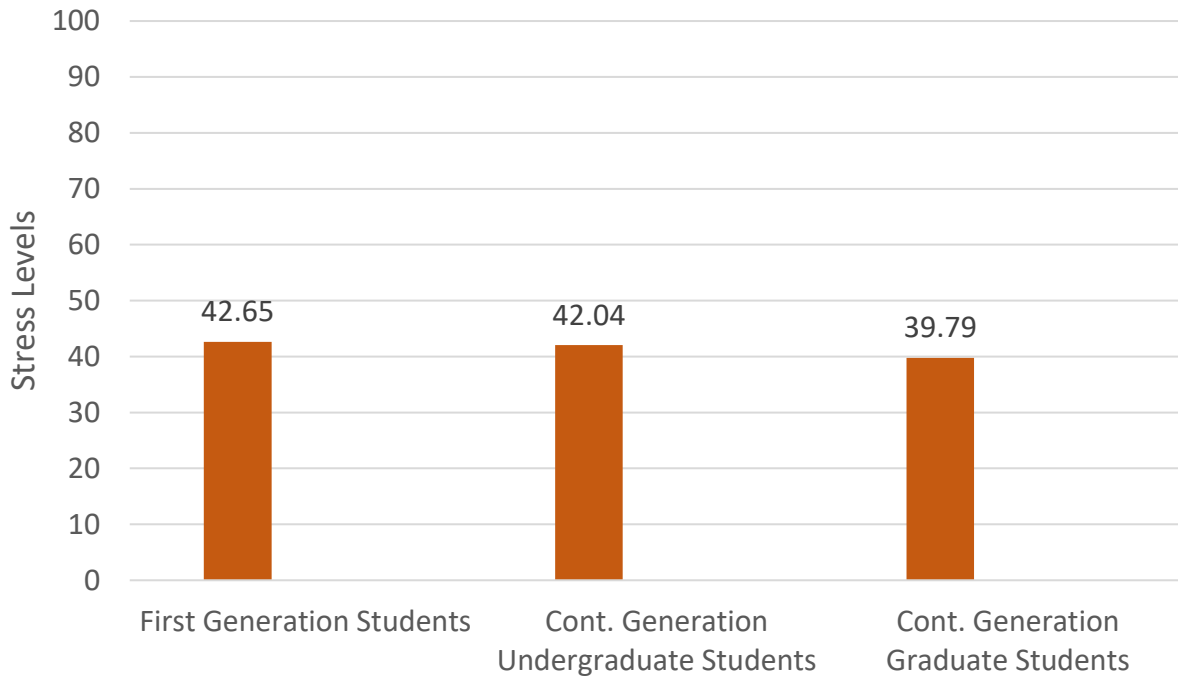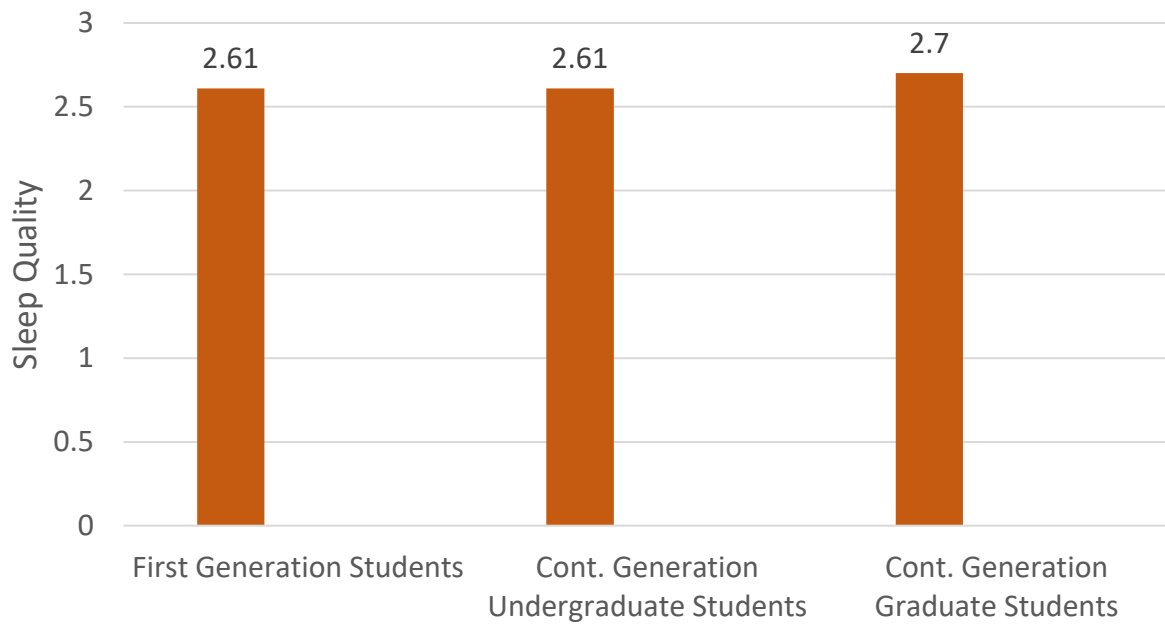- Cont. Generation Graduate Students: 2.7

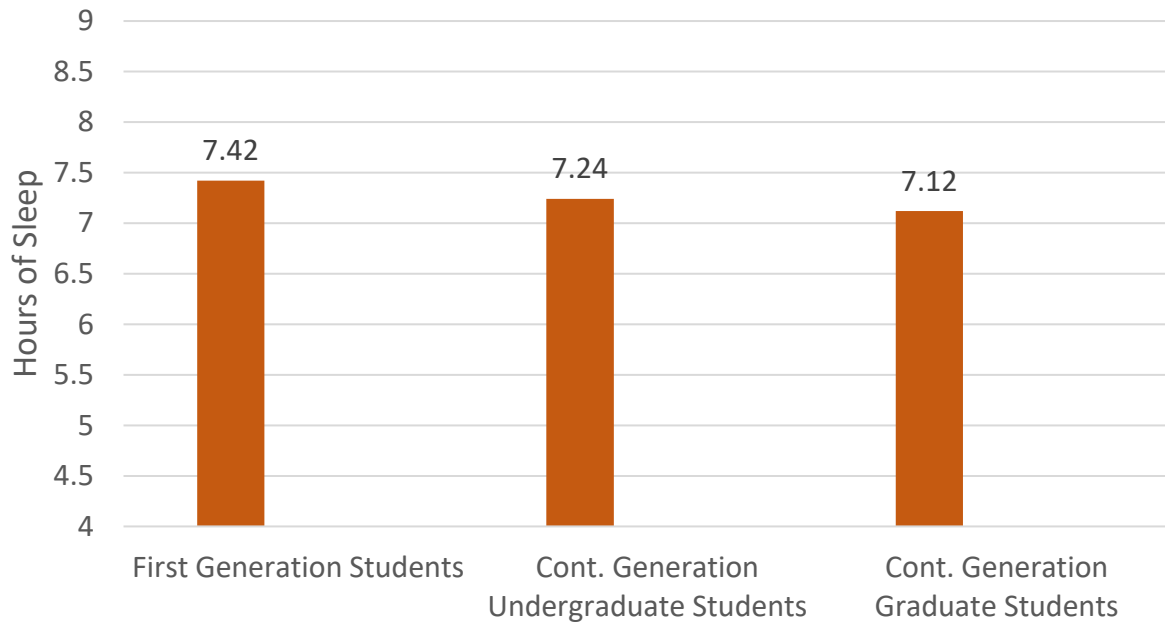Figure 3: Sleep Hours as a Function of Student Generation Status

Figure 4: Exercise as a Function of Student Generation Status
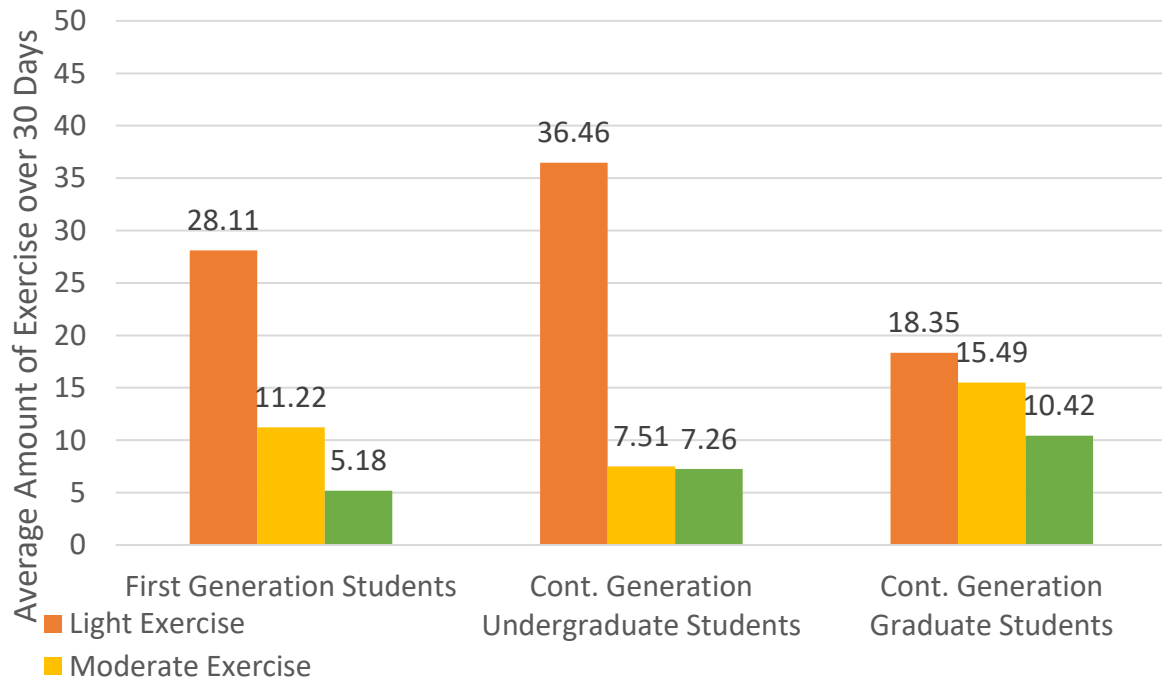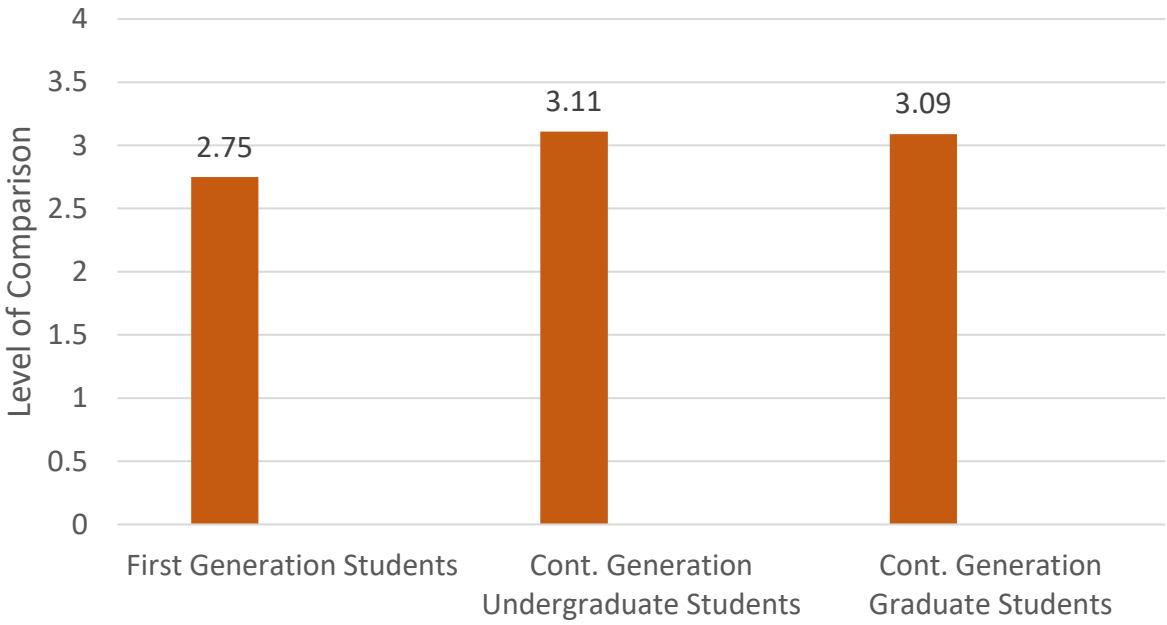
Figure 5: Social Comparison as a Function of Student Generation Status

Empathy and Leadership: A Motivational Perspective

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Taylor J. Buchness, McNair Scholar, The Pennsylvania State University

McNair Faculty Research Adviser: C. Daryl Cameron, Ph. D
Assistant Professor of Psychology
Department of Psychology
College of Liberal Arts
The Pennsylvania State University

Abstract

Some think that empathy makes for a good leader while others think that empathy gets in the way of effective leadership. To better understand this relationship, I test how people in imagined leadership positions choose to feel empathy for hypothetical employees. Transformational leaders, defined as charismatic leaders who stimulate employees intellectually and emotionally, tend to exhibit more empathy. Using a novel measure of empathic decision-making, I examine how transformational leadership relates to choices to engage in or avoid empathy when faced with hypothetical workplace violations. The results suggest no relationship between transformational leadership and empathy choice, however, there was a relationship between transformational leadership and helping preferences. As expected, cognitive costs associated with empathy were also associated with empathy avoidance, however, there was no relationship with transformational leadership and cognitive costs. The results of this study provide implications for the workplace regarding transformational leadership, prosocial behaviors, and empathy.

Introduction

Imagine an employee of a call center has been late to work every morning for the past week. A manager of the call center has a responsibility to speak with the employee about this constant tardiness. One manager in the call center would loosely be classified as a transformational leader, or a charismatic leader who meets emotional and intellectual needs of employees (Bass, 1990). This manager empathizes with the employee by trying to understand why they are coming in late. For example, the employee might be arriving late because of unavoidable construction on the way to work. If the manager empathizes with the employee's situation, the punishment could be reduced that the manager relates to the situation. In this example, empathy enhances workplace relationships and culture. On the other hand, a second manager, who values fairness and follows protocol over empathizing and who may be categorized as transactional, may oppose empathizing with the employee. Instead, this manager, out of concern for employee fairness, may punish the employee regardless of the situation. The decision to empathize as a leader is therefore an important topic to examine.

It is also important to explore differences in the choice to empathize between different leadership types, such as transformational and transactional leadership. Exploring this difference will aid in understanding how the two types of leadership can interact with employee behavior and potentially lead to more desirable workplace outcomes.

It is important to first understand the definition of empathy to better understand the relationship between empathy and transformational leadership. Empathy is a multidimensional construct that is comprised of emotional sharing, empathic concern, and perspective taking (Decety & Cowell, 2014). Emotional sharing is the ability to understand and share in the emotions of others. Empathic concern is the ability to care for others. Finally, perspective taking is the ability to view situations through the eyes of another individual (Decety & Cowell, 2014). This study will be focusing on experience sharing, specifically with leaders viewing the emotions of employees during a workplace violation. When deciding whether to approach empathy, there are several factors that either motivate or decrease motivation to empathize. These factors include suffering, material costs, interference with competition, positive affect, affiliation, and social desirability (Zaki, 2014). It is then possible that managers too may be weighing these costs and benefits when they consider empathizing.

Prior work has suggested that empathy is not often labeled as an important leadership skill because people think that it is inappropriate in a business setting (Holt & Marques, 2012). In this study, students were asked to rate which leadership traits (ex. Intelligence, charisma, vision) they thought were most important. Empathy was consistently rated as the least important leadership trait. In contrast, in a study by Kellet, Humphry, and Sleeth (2002), participants in groups rated their peers who performed a complex task as higher in empathy and also having higher perceived leadership. When controlling for complex task performance in a similar study, empathy is still found to be related to perceived leadership (Kellet, Humphrey, & Sleeth, 2006). Empathy has been found to be related to Leadership-Member Exchange quality (Mahsud, Yukl, & Prussia, 2010), and the Leadership-Member Exchange has been found to be related to higher job performance, satisfaction with supervision, and many other positive workplace outcomes (Gerstner, & Day, 1997). The Leader-Member Exchange Theory focuses on the two-way dyadic relationship between leaders and their followers and how the quality of the relationships is predictive of individual, group, and organizational outcomes (Gerstner, & Day, 1997). It then becomes plausible that when empathy becomes explicit, it seems to be avoided in a business setting. If that's the case, people in leadership positions may be choosing to avoid empathy.

The purpose of this study is therefore, to examine the relationship between empathy and different leadership styles. Different types of leadership may relate differently to the expression of empathy. This study aims to focus on transformational leadership, specifically. According to Bass (1990) transformational leaders are often defined as charismatic leaders who both intellectually stimulate and meet emotional needs of employees, perhaps with tools such as empathy. These leaders are often seen as more effective leaders compared to their more transactional-styled peers (Bass, 1990). Charismatic leaders, who are defined as envisioning, empathic, and empowering leaders, improve their employee's job satisfaction, task performance, organizational citizenship behaviors, and other positive impacts like these (Choi, 2006). Transformational leadership was also found to be more related to a "feeling type" of person, who displays emotions more often in contrast to other leadership types (Roush & Atwater, 1992).

It is then possible that having a higher capacity to express emotions may also support a higher capacity for emotion sharing capabilities. In a study by Skinner and Spurgeon (2005), self-reported measures of empathy of managers and subordinate-reported levels of transformational leadership have also been found to be related to each other, specifically the dimensions of empathic concern, perspective taking, and empathic matching. Emotional intelligence, of which empathy has been described to be a component (Salovey & Mayer, 1990), has also been shown to be related to transformational leadership (Barling, Slater, & Kelloway, 2000) and has an important role in effective leadership in general (George, 2000).

While there has been previous work on the relationship between transformational leadership and empathy (Skinner & Spurgeon, 2005), this study specifically aims to examine how transformational leadership relates to the decision-making processes of work leaders in the moment, when faced with a work-related problem. It could be useful to look at leader empathy moment-by-moment to understand why empathy is being avoided or engaged with. Using the Empathy Selection Task developed by Cameron, et al (under review) in this study, it is possible to look at work scenarios and decide whether to empathize with the employee or not in the moment. The Empathy Selection Task is a novel behavioral measure that will present these case-by-case scenarios over 40 trials giving participants a free choice between empathy and an alternative plan of action. Previous research with this task also suggests that people avoid empathizing with others because of the cognitive costs associated with empathy, such as difficulty or aversiveness (Cameron, Hutcherson, Ferguson, Scheffer, Hadjiandreou, & Inzlicht, under review). In this study, participants were asked to rate each deck on perceived effort and difficulty using the NASA Task-Load Index and the results found that participants found the empathy deck more effortful and difficult. These perceived costs were also associated with reduced empathy choice in the Empathy Selection Task. Using this measure in relation to leadership may be advantageous because most of the previous work discussed here used self-report measures, while this task allows for behavioral measures.

Based on Skinner and Spurgeon findings (2005), we hypothesize that high ratings of transformational leadership will correlate with choosing to express empathy when faced with a hypothetical workplace problem over a series of trials. We also hypothesize that costs associated with empathy will be related to empathy avoidance, as found in previous work (Cameron, et al, under review). We will address this hypothesis by asking participants to rate how difficult and challenging the empathy deck was to complete. It is possible, for example, that transformational leaders view cognitive costs associated with empathy differently than other leadership types, which may explain why they avoid it less.

Method

Participants

A total of 380 MTurk participants were recruited (60 female, 104 male, 1 other, $M_{age} =$ 34.17, $SD_{age} = 10.19$). Of the 380 recruited, 180 dropped out before finishing the survey, 1 was a repeat and was therefore excluded, and 34 were excluded for providing nonsense responses to the task. The proportion of participants that were white/Caucasian was 73.3%, for Black/African-American it was 17.6%, Hispanic/Latino was 7.3%, for Asian/Pacific Islander it was 5.5%, for Native American 1.8%, and other .6%.

Materials and Procedure

      Participants were first tested on their leadership style with the Multifactor Leadership Questionnaire (MLQ) with questions about transformational leadership such as, "I enable others to think about old problems in new ways," or "I am content to let others continue working in the same ways always" (Howell & Avolio, 1993). The participant's behavioral choices to avoid or express empathy were then measured using a modified version of the Empathy Selection Task (EST) with 40 trials (Cameron, Hutcherson, Ferguson, Scheffer, Hadjiandreou, & Inzlicht, under review). The instructions given to the participants for the EST included:

      Imagine that you are a leader of a successful company.

      In this task, you will complete a series of trials. On each trial, you will see a workplace problem vignette and two decks of cards (a FEEL deck and a DESCRIBE deck). Each of the vignettes describe a workplace violation. You should choose (between these decks) a pathway to solve the problem. Each deck has specific instructions. Depending on which deck you have chosen, you will then be given one of two possible sets of instructions.

      When you choose the FEEL deck, you will be told to have empathy and share in the emotional experience of the person in the vignette. The goal for this kind of trial is to feel empathy and share in the internal emotional experience of the person. On these trials, please provide three keywords to describe the emotional experience of this person (Example: "sad, hurt, confused" or "happy, pleased, interested"). It is okay to use the same keyword for different trials, just make sure you are describing the feelings and experiences of the person in the vignette (e.g. mood, emotion, etc.)

      When you choose the DESCRIBE deck, the goal is to be objective and focus on the behavior and quality of the person in the vignette. To be objective in this trial, try to focus only on the person's behavior. On these trials, please provide three keywords to describe the behavior of this person (Example: "forgetful, indecisive, careless" or "thoughtful, polite, innovative"). It is okay to use the same keyword for different trials, just make sure you are describing the behavior of the person in the vignette (e.g. conscientious, responsible, etc.)

      You are free to choose from either deck on any trial. Feel free to move from one deck to the other whenever you choose. If one deck begins to seem preferable, feel free to choose that deck more often. Overall, this task will take the same amount of time regardless of which deck you choose.

For each trial, the participants were given a workplace problem vignette modeled after business case studies from the MIT Management Sloan School and the Western Michigan Employee Code of Conduct such as, A) "A call center employee of yours has been late every day for the past week. You must speak with this employee," B) "A contractor under your supervision has been inflating the damage cost estimates in houses that they are working on for personal gain. You must speak with this employee," and C) "A toll-operator under your supervision has been giving back too much change at tolls. You must speak with this employee" (Case Studies, Employee conduct and disciplinary action, 2018). Participants were then told to select one of two pathways, presented as decks of cards, to create a solution to the workplace problem. The choice is to either feel what the employee is feeling during the experience (empathic pathway) or describe the quality of the employee during this experience (non-empathic pathway).

When the feel deck is chosen, participants were told:
Read the vignette and try to feel what this person is feeling. Empathically focus on the internal experiences and feelings of this person. Please write 3 keywords describing the experiences and feelings of this person.
When the describe deck is chosen, participants were told:
Read the vignette and try to notice the behavior of this person. Objectively focus on the behavior this person. Please provide 3 keywords describing the objective behavior of this person.

After a pathway was selected for each vignette, participants were asked "Please indicate how much you want to perform the following actions in relation to this employee:" and then indicate on a scale how much they would like to punish or help the employee ranging from "Do not prefer," to "Prefer a great deal".

Participants then completed the NASA Task-load index (Hart & Staveland, 1988). This measure has participants rate each deck on how effortful, aversive, and difficult they are to examine if people are avoiding empathy because of the cognitive costs associated. The index has items like "How mentally demanding was this deck?" and "How hard did you have to work to accomplish your level of performance with this deck?". To explore the relationship between social norms and the choice to empathize, participants completed a social norm measure with questions such as "How often do you think your employees would want you to show empathy?" "How useful do you think other people think empathy is for leadership?" and "How appropriate is empathy in a business setting?" Lastly, participants completed individual difference measures of trait empathy using the Empathy Index and the Interpersonal Reactivity Index as well as demographic measures (e.g., race, age, socioeconomic status, political orientation) (Bloom, 2017, Davis, Conklin, Smith, & Luce, 1996).

Results

Empathy choice and preferences to help and punish. Replicating previous studies that have developed the Empathy Selection Task (Cameron et al., 2018), participants showed a preference to avoid empathy, choosing empathy on average 42.27% of the time (*SD* = 29.89%), which deviated from chance, *t* (164) = -3.32, *p* = .001. Across trials, participants showed a moderate preference to help the employees (*M* = 2.85, *SD* = .84), and a moderate preference to punish the employees (*M* = 3.39, *SD* = .70), and the desire to punish was stronger than the desire to help, *F* (1, 164) = 37.35, *p* < .001. Empathy choices correlated with preferences for helping, *r* = .30, *p* < .001, but there was no relationship with preferences for punishing, *r* = -.03, *p* = .665.

Empathy choice and transformational leadership. The transformational leadership measure showed good reliability (Cronbach alpha = .89, *M* = 3.55, *SD* = .55). Transformational leadership was not correlated with empathy choice, *r* = .06, *p* = .459, contrary to our prediction. However, transformational leadership correlated positively with preferences for helping, *r* = .31, *p* < .001, and also with preferences for punishing, *r* = .19, *p* = .014.

Cognitive costs and empathy choice. Participants were marginally more likely to view empathy as effortful (*M* = 3.71, *SD* = 1.11) compared to objective detachment (*M* = 3.57, *SD* = 1.06), *F*(1, 163) = 3.16, *p* = .077, but did not view empathy as more aversive (*M* = 3.27, *SD* = 1.41) than objectivity (*M* = 3.28, *SD* = 1.40), *F*(1, 163) = .01, *p* = .912. Additionally, participants were less likely to feel successful at empathy (*M* = 3.79, *SD* = 1.19) than at objective detachment (*M* = 4.02, *SD* = .90), *F*(1, 163) = 6.05, *p* = .015. These results suggest that empathy is generally felt as more cognitively difficult, as in prior work (Cameron et al., 2018). We computed difference scores for effort, aversiveness, and efficacy. Empathy choice correlated with efficacy, *r* = .35, *p* < .001, but not with effort, *r* = -.04, *p* = .631, or with aversiveness, *r* = -.09, *p* = .265. Preferences to help also correlated with efficacy, *r* = .27, *p* = .001, but not with effort, *r* = .01, *p* = .896, or with aversiveness, *r* = .06, *p* = .416, and preferences to punish were not correlated with any of the difference scores (*p* > .070). These results replicate prior work showing that perceived efficacy at empathy associated with empathy choice (Cameron et al., under review). Finally, leadership did not correlate with any of the cognitive cost difference scores (*p* > .380). It appears that any prosocial impact of transformational leadership in the current study may not be due to cognitive costs, according to these results.

Trait empathy. Replicating some prior work (Skinner & Spurgeon, 2005), transformational leadership correlated with self-report trait empathy on the Interpersonal Reactivity Index, with positive correlations with Empathic Concern (*r* = .21, *p* = .007), Perspective Taking (*r* = .47, *p* < .001), and Fantasy (*r* = .20, *p* = .009). However, there were not correlations with the Empathy Index measures of Empathy (*r* = .10, *p* = .184) and Behavioral Contagion (*r* = .12, *p* = .115). Table 1 displays correlations between the trait empathy measures and leadership, empathy choice, and preferences for helping and punishing.

Social norms. The three items about how others value empathy was averaged together, and the two items about how participants themselves value empathy were averaged together. Believing that others value empathy was not correlated with empathy choice, *r* = -.06, *p* =.443, nor with punishment preferences, *r* = .15, *p* = .053, but was positively correlated with helping preferences, *r* = .21, *p* = .007. Personal beliefs that empathy is valuable were not correlated with empathy choice, *r* = .02, *p* =.810, nor with punishment preferences, *r* = -.08, *p* = .340, but was positively correlated with helping preferences, *r* = .27, *p* = .001. Transformational leadership correlated positively with believing that others value empathy in business and leaders, *r* = .28, *p* < .001, and also with personal beliefs that empathy is valuable in these settings, *r* = .18, *p* = .018.

General Discussion

In this study, we tested the relationship between transformational leadership and empathy choice. While our hypothesis about the relationship between transformational leadership and choosing empathy was not supported, we did find that people, on average, chose to avoid empathy, consistent with previous work (Cameron, et al., under review). The choice to empathize also correlated with choosing to help the employee. Transformational leadership also correlated with choosing to help and with choosing to punish the employee. In general, participants showed a moderate preference to punish and help the employees, however, the desire to punish was stronger.

The second hypothesis focused on cognitive costs associated with empathy. We found that participants felt the empathy deck was more effortful than the objective deck, but not more aversive. The results also indicated that participants felt less successful at completing the Feel deck, replicating previous results (Cameron, et al, under review). There was no relationship between empathy choice and effort or aversiveness associated with the deck, but there was a positive relationship between empathy choice and how effective the participants thought they were at completing the empathy deck. The results suggest no relationship between transformational leadership and any cognitive costs associated with the empathy deck.

Transformational leadership correlated with self-reported empathy, specifically with the subscales of the Interpersonal Reactivity Index of empathic concern, perspective taking, and fantasy similar to previous works (Skinner & Spurgeon, 2005). There were no correlations with the self-reported Empathy Index measures and behavioral contagion (i.e. mirroring another's behaviors), however. This difference in results between the two scales could be due to the two scales measuring different facets of empathy. It might be possible that for transformational leadership, the emotion sharing aspect of empathy, measured by the Empathy Index, may be less important than the more prosocial aspects of empathy such as compassion and perspective-taking. The Empathy Selection Task used in this study also measures emotion sharing, so this could be another reason why no correlation was found between transformational leadership and empathy choice.

These results used a behavioral measure of the Empathy Selection Task and find no relationship between transformational leadership and empathy choice, contrasting with previous findings of a relationship using a self-report empathy measure (Skinner & Spurgeon, 2005). When the relationship between transformational leadership and the self-report empathy measure (IRI and EI) in this study is examined, however, the results of the previous work are supported. Transformational leadership also relates to choosing to help employees when given a choice in our task. It could be possible that self-report measures of empathy finding a relationship between empathy and transformational leadership are measuring past prosocial actions, such as helping employees, instead of empathy specifically. Participants rating their own empathy may be conflating empathy and prosocial actions.

The social norms measure used in this study focused on how oneself and others value empathy. We found that believing others valued empathy did not correlate with choosing empathy or choosing to punish the employee but did correlate with choosing to help the employee. Similar results were found for self-values of empathy; valuing empathy did not correlate with empathy choice or choosing to punish, but it did correlate with choosing to help. Transformational leadership was found to be correlated with believing that empathy is valuable, as well as believing others think empathy is valuable.

This study's findings that people are avoiding empathy replicate previous findings (Cameron, et al., under review). One factor of empathy avoidance could be that leaders feel like empathy is inappropriate in the workplace, and therefore empathy may be more effortful because the leader must overcome his or her predispositions towards the emotion. The results of the social norms measure show that empathy choice was not correlated with believing both self and others valued empathy, which may be some indication of the attitudes towards the appropriateness of empathy. However, the results also indicated that there wasn't a correlation between beliefs of empathy values and empathy choice, meaning that beliefs in empathy value do not translate into choosing empathy. Even if beliefs about empathy were not correlated with empathy choice, helping choices did correlated. Perhaps, again, empathy may not be as important to transformational leaders as prosocial behaviors such s helping.

This current study adds to the growing literature about attitudes about empathy in the workplace. Transformational leadership is often thought to be the more empathic leadership style, but the results of this current study suggest that it may not be entirely empathy that is driving the prosocial behaviors of these types of leaders. Transformational leaders were not choosing to empathize any more often than other leadership styles when using a behavioral measure. Understanding the processes behind the decision making of leaders with regard to empathy can make it easier to predict how transformational leaders will react to problems in the workplace. The results that empathy choice is correlated to helping behaviors possibly suggests that empathizing with subordinates may predict more prosocial behaviors in the workplace. These results also found that empathy avoidance is correlated with how effective the participant felt they are at empathizing. Perhaps empathy in the workplace could be promoted if expressing empathy is accepted and leaders, or people in general, feel supported when they choose to empathize.

The results of this study could be strengthened if some limitations are addressed. One such limitation could be that we used the general populous instead of targeting specifically leaders or managers as a sample. Using managers or leaders could strengthen the findings because as sample of leaders could be more realistic. Another improvement could be to use a more immersive leadership manipulation, where the participants are assigned leadership roles and subordinates. This could be helpful because a manipulation such as this could more closely model real life and therefore produce more accurate results. A future direction to build on these findings could be to target specific occupations to sample from. There could be a difference in the role of empathy in certain occupations. It could also be interesting to further develop the vignettes used in this study to strengthen them for future use. Currently, no strong set of workplace problem examples such as this exist. Another possible direction to explore could be differences in race, age, or gender and how these are affecting empathy choice. Could female leaders be empathizing more than males? Perhaps younger leaders are empathizing differently than older leaders.

While the results of the relationship between transformational leadership and empathy may be based on the measures used, transformational leadership does predict more prosocial behaviors such as helping. The cognitive costs associated with empathy are also important to keep in mind, as they may be affecting whether leaders in general are choosing to avoid or engage with empathy.

Table 1.
Correlations Between Leadership and Empathy Measures.

	Leader.	Emp. Choice	Help	Punish	IRI EC	IRI PD	IRI PT	IRI FS	EI Emp.	EI Beh.
Leadership	1.000	.058	.312**	.190*	.209**	-.255**	.465**	.203**	.104	.123
Emp. Choice	.058	1.000	.303**	-.034	-.032	.214**	.009	.090	.343**	.318**
Helping	.312**	.303**	1.000	-.033	.015	.173*	.086	.104	.351**	.381**
Punishing	.190*	-.034	-.033	1.000	-.188*	.105	-.101	-.155*	.114	.065
IRI EC	.209**	-.032	.015	-.188*	1.000	-.069	.608**	.456**	.028	-.096
IRI PD	-.255**	.214**	.173*	.105	-.069	1.000	-.261**	.151	.583**	.540**
IRI PT	.465**	.009	.086	-.101	.608**	-.261**	1.000	.438**	-.004	-.081
IRI FS	.203**	.090	.104	-.155*	.456**	.151	.438**	1.000	.336**	.290**
EI Empathy	.104	.343**	.351**	.114	.028	.583**	-.004	.336**	1.000	.766**
EI Behavior	.123	.318**	.381**	.065	-.096	.540**	-.081	.290**	.766**	1.000

Note. *p<.05. **p<.01. IRI EC = Empathic Concern. IRI PD = Personal Distress. IRI PT = Perspective Taking. IRI FS = Fantasy. All correlations have $N = 165$ except those involving the IRI and EI sub-scales, which have $N = 164$.

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Real Men (Don't)…Progressive Black Masculinity at The Pennsylvania State University

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Jevon Corpening II, McNair Scholar, The Pennsylvania State University

McNair Faculty Research Adviser: Uju Anya, Ph. D
Assistant Professor Second Language Education
Department of Curriculum and Instruction
College of Education
The Pennsylvania State University

Abstract

Black masculinity is often dichotomized and oversimplified in American media and popular culture. These portrayals create stereotypes of how black men are expected to behave. Addressing these stereotypes and their implications at higher education institutions may aid university administration in better serving black male students. Through a qualitative analysis of four black college men at a large research university, this project explores how black male collegians conceptualize and express their manhood and masculinity, as well as how this identity is impacted by the social and academic environments of the institution.

Keywords: Black men, college, masculinity

Historically, black men and their masculinity have been defined by American media and popular culture (Ferguson, 2000; Ford, 2011; hooks, 2004). Consequently, black men have not been able to be the authors of their own manhood and masculinity, black masculinity has been grossly oversimplified (Pelzer, 2016). Since masculinity is complex and varied due to diverse experiences (Connell, 1995; Connell & Messerschmidt, 2005; Lynch, 2009), generalizations cannot be made. Black men experience masculinity differently because of various group identities such as age, sexuality, spirituality, physical ability, and socioeconomic status (Cooper, 2006; Pelzer, 2016). Cooper (2006) also asserts there is a dichotomization of masculinity for heterosexual black men who are forced to fit either the "Bad Black Man" stereotype, in which they are characterized as sexually and criminally deviant, or the "Good Black Man" stereotype, which is represented by the black man who distances himself from his heritage, and black people while assimilating into white mainstream culture. American society has socialized and racialized black men in many ways; black youth may internalize or rationalize these limited images of themselves. The manifestations of said internalization can be seen when youth reach emerging adulthood and higher education institutions (Ferguson, 2000; Harper, 2004).

The black male experience is also oversimplified as it relates to higher education. The black male collegiate experience is stained with deficit narratives about the academic achievement and pursuit of leadership opportunities (Dancy, 2011; Harper, 2004). Though there are troubling statistics concerning black male collegians (BMC), understanding the propensity for expelling such narratives, and their implications for black male students is important.

Additionally, these are the experiences of some black male collegians, it is not the story for all. When it is the case for a black collegian's experience, the impetus could be, in part, the endless adverse stereotypes pushed by media and popular culture, coupled with deficit narratives proffered by researchers, creating the low expectations of black male students on college and university campuses. As the majority of colleges and universities are predominantly white institutions (PWI), they do not foster the healthy environments needed for the academic, social, and psychological achievement of black male students; these environments reinforce stereotypes detrimental to black men (Boyd, 2017). At PWIs, the negative stereotypes provided by American society permeate the experiences BMC have with their peers, faculty, and staff (Harper, 2006a, 2006b) These stereotypes create marginalization and curb the development of black male students on campus. As a result, these environments impede BMC's sense of belonging, academic accomplishment, co-curricular engagement, pursuit of faculty and staff relations, and self-esteem, which are all determinates of success for students (Boyd, 2017; Harper, 2015).

Black men are often aware of the stereotypes about them, and they either succumb to unproductive and self-destructive definitions of masculinity or find ways to combat and cope with those stereotypes (Davis, 1994; Harper, 2004; Harris, Palmer & Struve, 2011; Pelzer, 2016; Boyd, 2017). How black male students interpret perceptions of black maleness, in and outside campus contexts, and how they express these notions has implications for how they navigate the university environment, which in-turn impacts how the institutions engage with them; in essence, black men may experience university through their masculinity (Pelzer, 2016). Similarly, black male collegians internalizations of 'acceptable' masculine behavior may be able to aid in explanation of their classroom performance, disposition towards campus involvement, and aspirations towards graduation (Harper & Davis, 2012; Harris, Palmer & Struve, 201; Pelzer, 2016). Examining the experiences of black male students on college campuses provides multiple potential benefits. Given student engagement, adjustment, and identity development have been identified as determinants of success in college (Dancy, 2011; Harper, 2004), exploring how black male students negotiate their gendered and racial identities is important, as it relates to their experiences on campus. Understanding their experiences may help university administration and private organizations boost completion rates for BMC. Also, affording black male collegians with the opportunity to discuss their identities, and how they are perceived on campus may aid them in believing academic and professional success are acceptable expressions of their masculinity, thus aiding their achievement at higher education institutions. Lastly, providing black male collegians with a platform to narrate their own experiences will add to the work being done to balance the plethora of deficit narratives about them.

Review of the Literature
Conceptualizing Masculinity
Understanding gender, manhood, and masculinity is important. These terms are different from sex, which describes the biological characteristics of bodies, namely "male" and "female" (Shrock, 2009). Unlike biological sex, gender is a set of socially constructed relationships, teachings, and interactions reminding one of the appropriate behaviors of expression (Courtenay, 2000; Dancy, 2011). Manhood and masculinity are often used interchangeably, but it is important to highlight the difference between them. Manhood is characterized by the ideas shaped through social interaction, or how one defines a man; whereas masculinity describes the

behavioral expressions and performances of manhood constructions (Dancy 2011; Shrock, 2009). Essentially, manhood is the definition of man, and the practices employed to demonstrate those definitions is masculinity.

Hegemonic Masculinity

As manhood and masculinity are social constructs subject to change through time and across societies, there are different ways to conceptualize and perform them; in other words, a structure of multiple masculinities has been proposed by Connell (1995), and noted by other scholars (Connell & Messerschmidt, 2005; Jackson & Balaji, 2011). This structure suggests there is a hierarchy of the numerous ways to perform masculinity, in which some masculinities are more accepted by society (Connell, 1995; Connell & Messerschmidt, 2005). Masculinity most honored by society has been dubbed hegemonic masculinity, theorized by Connell (1995) as the practice allowing men's social dominance over women. Hegemonic masculinity is the current most honored performance of being a man and requires all men to position their masculinity in relation to it as well (i.e. black men, poor men, and gay men). Lynch (2009) adds to this when describing the hegemony as:

"[involving] physical strength; economic success; control; exclusive heterosexuality and the search for sexual conquests even if by force; athletic prowess; stoicism and suppression of emotions that convey vulnerability such as empathy, sadness, and the like; and the patrolling of other men's masculinities (as well as women's femininities). Hegemonic masculinity is also exemplified in the white, Christian, and "able-bodied" male body." (p. 412)

As hegemonic masculinity is the benchmark by which all men must measure their masculinity, fulfilling these expressions may prove difficult for some men. For instance, Male Gender Role Conflict as described in O'Neil's (1981) research describes this difficulty; it is characterized as the emotional and psychological angst stemming from fear of femininity and an inability to live up to socially constructed ideals of masculinity.

Black Masculinity

Black men are often unable to perform their masculinity in ways deemed socially acceptable when compared to hegemonic masculinity. This inability to perform their masculinity in those ways, along with the need to address the internalized stereotypes about their masculinity, means black men renegotiate their definitions of manhood and masculinity (Ford, 2011; Harper, 2004; Pelzer, 2016). Some of these renegotiations are similar to the accepted performances, which are often seen as unhealthy or toxic, such as aggression, restrictive emotionality, or homophobia. Other renegotiations are considered as healthy and positive. These performances of black masculinity, both positive and negative, include: competition, material success, restrictive emotionality, homophobia, leadership, resiliency, responsibility, and community and family involvement (Dancy, 2010; Harper, 2004; Harris, Palmer, and Struve 2011; Ikard, 2013; Maguire & Harper, 2014;). One method of reframing masculinity prevalent among black men is "cool pose" (Harris, Palmer, and Struve 2011; Major & Billson, 1992). Cool pose is used as a tool to cope with the daily systemic oppression black males face. It is comprised of a unique way to carry oneself, including dress, speech, gait, sexual promiscuity.

Though some of the performances of cool pose may be perceived as unhealthy, this coping mechanism is a way for black men to project confidence in a society in which they are consistently ostracized. Cool pose is prevalent among some black men, but not all employ this strategy of renegotiation.

Black Masculinity and the Campus Environment

Attending university is a critical moment in the lives of young men and woman; besides academic stressors, students learn to negotiate their identities, bodies, relationships, and sexualities in new ways (Ford, 2011). Research has also shown the benefits a healthy, conflict free masculine identity has for male students, including positive outcomes in areas such as academics or self-concept (Harris, 2004). Therefore, as with all students, it is of the utmost importance for black male collegians to understand their identities to excel in higher education.

Black men should resolve internalized oppression about their maleness (Collins, 2004; hooks, 2004), and some of the issues they face at higher education institutions are based in the manifestations of the internalized oppression (Pelzer, 2016). This internalization manifests by way of beliefs black men have about themselves, for instance they do not see themselves as congruent with academic and professional success; they see these accomplishments as reserved for Whiteness, which causes them to disassociate those themes with themselves (Collins, 2004; Harper, 2004;). Black youth reject academic success because of these internalizations about themselves and their cognitive abilities; they associate black male professionals and academic success in the White man's systems with an effeminate less masculine black man (Collins, 2004). Collins (2004) also proposes the terms "intellectual punks" and "academic sidekicks" who to black youth are the black men who assimilate and are subordinate to white culture and society.

As black youth reach emerging adulthood and university campuses, they must address the stereotypes, the source of their internalized oppression, both within themselves, and from the institutions they attend (Boyd, 2017; Harper, 2015). Addressing these stereotypes can unfold in different expressions of masculinity. As aforementioned, cool pose is one way in which men address their positioning in American society. They use cool pose as a coping mechanism to project confidence, in a system that consistently marginalizes them. Nevertheless, cool pose is not the only one-way black men can renegotiate their masculinity.

There are some black male collegians on university campuses who reframe their masculinity in other ways including: being leaders of their families and communities, academic success and being responsible (Harper 2004; Harris, Palmer, & Struve 2011; Henfield 2012; Ikard 2013). Interestingly, these differing renegotiations of black masculinity are generally held by different types of students; high achieving BMC have more positive renegotiations and those of lower-achieving BMC are unhealthier. For instance, high-achieving BMC do not see material success and being a "baller" as important to their manhood and masculinity, and critique their peers who do (Harper, 2004).

Even though there have been divergent expressions among black male collegians, some concepts were still present across both student types: homophobia, to be a player of women, and a restrictive emotionality. Though, as society becomes more progressive, some black male collegians may have begun to express their masculinity in congruence with Mutua's (2006) concept of progressive black masculinity: which she defines.

"Progressive [Black] masculinities, on the one hand, personally eschew and actively stands against social structures of domination and, on the other, value, validate, and

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empower [Black] humanity . . . and multicultural humanity of others in the global family. More specifically . . . at a minimum, [they are] pro-[Black] and antiracist as well as profeminist and anti-sexist . . . They are decidedly not dependent and or not predicated on the subordination of others." (p.7)

There seems to be a correlation between the negotiation of masculinity amongst black male students and their experiences on campus. High achieving BMC who have shown resiliency to stereotypes and have shown the ability not only to persevere, but to succeed in college. The students who have been able to understand how their identities function on campus have been able to flourish academically and professionally. However, it is understood these students are not the majority. Assisting all black male students in their understanding of their experiences as black men on campus, and how to cope with stereotypes about their identities in beneficial ways may be a key to helping these students reach higher rates of retention and gradation. Examining the masculine identity development and expressions of BMC may be one approach to aid these students and boost their degree attainment.

Research Procedures

This exploratory research seeks to explore how black male collegians at The Pennsylvania State University conceptualize and express masculinity, as well as if the institution has impacted those conceptualizations and/or the expression of their masculine identities. The research questions under investigation include: What do black male students at Penn State believe about manhood and masculinity? How do these students come to these beliefs? Has Penn State influenced the development of their beliefs?

Overall Approach and Rationale

The research study is a qualitative study based in a focus group and two individual interviews to examine how BMC at Penn State have come to define and perform their identities on campus. The study benefitted from the style of the focus group and the individual interviews as they imitate an individual and group social settings. The information gathered from these contrasting contexts had the potential to provide insight into how participants behave in various situations.

This allowed for more accurate analysis how a different context may influence their expressions of masculinity, allowing for a, though not an all-encompassing, more precise conclusion.

Site and Sample Selection

Four undergraduate students at the Pennsylvania State University who were present on campus were the participants of this study. Participants represented a wide range of majors from Energy Engineering, Psychology, Economics, and Information Systems Technology; they have an average GPA of 3.0. All participants identify as heterosexual; Two identify as African-American, one as African-American and Turkish, and the last as Ghanaian. The students in this study frequent a host of organizations of campus, some are dedicated to supporting multicultural students while others are not.

The site of this study is Penn State primarily because it is the site most readily available to the research, however this is also a suitable site because there have been intra-communal attempts to address the problems black male students face on campus. Penn State's population of black male collegians is small. Including women, about six percent of the 41,000 students are

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black or African-American, which means the percentage of men alone is even lower. Though the population of BMC is small, there have been efforts to support these students. The Black and Latino Male Empowerment Group holds regular meetings to support black men on campus by encouraging them to seek academic and social opportunities, to aid them in navigating their undergraduate experiences efficiently and effectively. Additionally, the Black Men on the RISE award ceremony aims to celebrate the achievement and leadership of black male students. Programs like these could potentially impact how BMC see themselves, and their ability to achieve academic success. The efforts made to support black males at this institution may change their conceptualizations and expressions of masculinity on campus; which could provide insight into how issues these students encounter may be addressed.

Data Collection Methods

Audio and video recordings, field notes, individual interviews, and the focus group were the main data collection instruments. The study began with an in-take interview, with the aim of gaining basic demographic information about the participants such as: age, hometown, religion, sexual orientation, major(s), minor(s), and number of co-curricular activities. This was also used as a moment to begin building rapport with participants. I answered any questions regarding the study or its purpose. To begin this interview, I used a demographic survey, but allowed for open ended responses, if they arose. The interview was guided by my questions and statements about masculinity, manliness, and manhood; the participants provided their answers. The students were asked how *real* men carry themselves, treat other people, and other characteristics of an ideal *real* man. Participants were then asked to respond to statements or questions with terms including *real* man. I asked the subjects to identify men on campus and/or in the media who embody their ideals of masculinity, and why. In addition to their beliefs about masculinity, they were encouraged to share members of their family, community, or others who have had an impact on their understanding of masculinity and manhood. The purpose of this interview was to start a positive relationship with the participants and to begin a working understanding of how they conceptualize manhood and masculinity. I took brief notes, if necessary, which were helpful in constructing useful questions about their experiences on campus during the focus group. The individual intake interviews lasted from 30 to 75 minutes.

After each of the four participants had an in-take interview, the next phase of this study was a semi-structured focus group. The participants reflected on their experiences as black men on campus, why they had those experiences because of their identities as black men, and how they are perceived by others. I used a set of fixed questions but allowed room for digression related to their experiences as black men in other spaces. The purpose of the focus group was to gain a shared, collective understanding of the experiences and beliefs of the participants at the site. The focus group lasted 90 minutes.

The individual interview, post focus group, was used to conclude the data collection for the study. These interviews were guided by findings --from the previous interviews-- on which I sought elaboration. The main question of this interview prompted the students to reflect on ways in which the university could improve upon the experiences of black male students on campus. The participants were encouraged to share last thoughts on black masculinity at the site, or in general. The purpose of this part of the study is to be a 'wrap-up' to the students' beliefs and obtain their final thoughts on their experiences. These interviews lasted from 15-30 minutes.

Each interview was audio and video recorded, to reference throughout the data analysis process. Recordings allowed me to review exact quotes from the interviews, rather than relying solely on notes and memory; recording the interview sessions aided in accuracy of conclusions made in this final report.

Data Management and Analysis

Several themes including: Competition, Material Success and being a "Baller", Aggression, Restrictive Emotionality, Homophobia/Fear of Femininity, Womanizer/Player of Women, Leading the Family and being the "Breadwinner", Giving Back to the [Black] Community, and Resiliency were adapted, from primarily Harper (2004) and Harris (2011), and used to conduct thematic analysis. I compared participants' responses to these themes to understand their beliefs about manhood, and how they express their masculinity. I used deductive/inductive reasoning to establish connections between the developments of the participants' conceptions and expressions of manhood and masculinity and their experiences on campus, to understand the impact, the site has had on the participants.

Role of the Researcher

I approached the study as an interviewer and nonparticipant observer, during the individual and focus groups interviews. My identity as a 21-year-old black male student attending the same university as the participants, potentially gave me a unique positioning from the participants' point of view. This positioning may have opened an entry way to incredibly candid responses, if the participants saw me as one of them. The ability to relate to the participants' experiences proved to be beneficial to this study.

Nevertheless, as I am a part of the student population I am researching, I inevitably came to the research with my own experiences influencing my beliefs about black masculinity, and its development and expression at the research site. My experiences had the potential to affect how the data was analyzed. Those experiences may have caused me to hypothesize, conclude, and deduce about the data in ways I otherwise would not, if I were not similar to the subjects. Similarly, as the participants may have identified themselves with me, and saw me as a member of their community, this may have caused students to inhibit their vulnerability with me. Students may not have been completely open with me, because they could interact with me at the site after the research concluded. This would not happen if I were not a part of the school community, because I would leave the site after the research ended; the participants would not have to fear a member of the school community knowing intimate details about their lives and beliefs. To curb this potential barrier, I ensured at every step of the process the participants of their anonymity[1] in data collection and the final report.

Observations and conclusions made in this qualitative study depend on subjective responses and inferences by me, the researcher, and participants. To provide an accurate report and analysis of the focus group and individual interviews, participants were invited to comment on the final product before publication, ensuring misrepresentation of their responses did not occur.

Before the start of the interviews, the participants were again provided with the purpose and background of the study. They were also given an informed consent form, and asked to confirm their participation. In addition to consent considerations, any identifying information was removed from the final product. They were assured their responses will have no impact outside of the purposes of this study.

Limitations

The size and diversity of the study make it difficult to generalize to the larger black male student population at Penn State. This study is also limited by the students' willingness to be truthful and present, literally and figuratively, during the focus group and individual interviews, which increases the difficulty of verifying and establishing causality in this study.

Findings

This study questioning how black male collegians conceptualize manhood and masculinity investigated 1) What do black male students at Penn State believe about manhood and masculinity; 2) Where do black male students learn those beliefs; and lastly, 3) has Penn State influenced their beliefs and/or expressions? The participants presented data not entirely congruent with the themes used to guide interviews. The themes of Competition (through sports), Material Success and being a "Baller", and Aggression (Tough Guy) were not supported by the data found in this study. Mainly, the participants expressed themes of masculinity beneficial to their success (e.g. resiliency and giving back to the black community) and strayed away from oppressive conceptions (e.g. restrictive emotionality, womanizing, and homophobia) (Connell, 1995; Lynch, 2009). When the participants did express their beliefs related to themes such as leading the family and giving back to the black community, they were elaborated on in ways not shown in the studies from which they are drawn. By and large, participants did not define manhood and masculinity by being a womanizer, homophobic, or restrictive in emotional expressions. Additionally, as related to these themes, many expressed a maturation within themselves, which has caused them to begin on a path towards progressive black masculinities as proposed by Mutua (2006).

Conceptions and Expressions of Manhood and Masculinity

Restrictive Emotionality: "It's okay to be vulnerable sometimes" –Kwadwo

Restrictive emotionality, characterized by stoicism, and the inability to show emotions other than anger, frustration, and the like, is used by hegemonic masculinities to police other masculinities and identities (Connell, 1995; Lynch, 2009). All the participants express sentiments similar to Charles when he says:

Charles, Individual Intake Interview

"I realize, I can't bury everything that happens to me, 'cause if you keep buryin', and buryin', eventually it's gonna come up, and you don't want it to be such a breakdown to the fact where it affects you mentally and things like that. It's one of those things I'm doing [processing emotions] to be mentally healthy, and to get myself together."

Austin furthers this by asserting restrictive emotionality makes it hard for people to deal with their problems later in life. Similarly, Kwadwo reflects on societal expectations of black masculinity in relation to restrictive emotionality, which he says hinders important connections between men in his comment:

Kwadwo, Individual Intake Interview

"I think a lot of people view black men being emotional as not being strong… it's really evident when we interact with each other. You can tell when compared to women, like, they are lot more comfortable, just being more open with each other. But men, you know, we always have that wall

up, we keep our distance, it's harder for us to connect with another man on a personal level. There are a lot more hoops you have to jump over…. There's just a lot more extra hoops that we have to jump over, hoops that don't necessarily need to be there, but the way we were raised, and the way we came up [is why they are there]."

Participants realize societal standards of restrictive emotionality present potentially hazardous effects and note these expressions of masculinity as archaic and traditional. The participants are glad men are now able to express a wider range of emotions, Charles states:

> **Charles, Individual Intake Interview**
> "I think there are some steps in the right direction [of men being able to process and express emotions openly] …I do think it's a good thing that in 2018 we are definitely moving towards that right direction."

These men want to be able to show their full range of emotions because it helps them connect with others and preserve their mental and emotional health. Expressing emotion was integral to other concepts related to their masculinity [e.g. Giving Back to the [Black] Community and Leading the Family]. All participants said being connected with others is important to being a *real* man; participants describe *real* men as being caring, compassionate, and connected with others -- unrestrictive emotionality is essential to each of those characteristics--. Unrestricted and open emotionality is important to their health, and their ability to accomplish their goals of being *real* men.

> **Homophobia/Fear of Femininity***:* "Someone being gay doesn't take away from the five-character traits that I would call a man, if you embody those character traits, then it is what it is." –Charles

> Fear of femininity is often shown through restrictive emotionality and distancing oneself as much as possible from homosexual 'tendencies', often expressed through homophobic actions actively oppressive towards the LGBTQ+ community (Connell, 1995; Lynch, 2009). It is the fear of not being 'sus' [suspected of being homosexual] (Harper, 2004; Harris, Palmer, Struve, 2011). Supporting the LGBTQ+ community, and not marginalizing its identities is important to these men and their journeys towards progressive masculinity. Some of the men in this study unknowingly spoke to the theory of multiple masculinities (Connell, 1995) in their comments on men being different, and not always able to perform their masculinity in the most socially accepted ways. Many of the participants again comment on the ways society influences homophobic beliefs. Clark, candidly reflects on reconciling his spirituality with homophobia:

> **Clark, Individual Intake Interview**
> "In church, they say, 'Oh, homosexuality is a sin', and all this other stuff. So, I'm like okay, I see, you read the passage, man and woman, this kind of stuff, okay I get it, reproductively I guess it makes sense; I understand this point of view. But I'm like, the next passage is 'love thy neighbor' and all this other kind of stuff. So, I'm like, you can't do both, you physically can't do both."

This excerpt stems from a question asking Clark from where he has learned his beliefs about manhood and masculinity, as he comments on his spirituality, he opens up about apparent contradictions of homophobia and loving all people in his faith.

Not only does Clark mention his reluctance towards homophobic tendencies, but he also adds about how as he learns more about other identities, his social justice activism for these populations has increased. He says:

Clark, Individual Intake Interview

"That's definitely when I started to change my perspective as to how I view social justice issues, how I view racial issues, how I view gender issues, like gender and sexuality issues. Like a lot of these things that are new, I don't wanna say new, so to speak, but definitely new to me. Since leaving high school and coming to Penn State, my activism and education have increased tremendously. It's definitely much more apparent when it comes to the LGBTQ and their struggles, and learning about the history, this has always been an apparent thing."

Other participants express views of acceptance, and appreciation of the direction society is moving regarding acceptance of the LGBTQ+ community. Kwadwo speaks on the experiences of his cousin, who he respects for the strength he showed in coming out to a family vehemently against homosexuality, when he says:

Kwadwo, Individual Intake Interview

"I've known him my entire life, me having that conversation with him, I was just like 'okay, it's not gonna change anything.' No matter what to me he is just [name]."

Kwadwo and other participants expressed their respect for the strength it takes to confront the struggles encountered by the LGBTQ+ community. The participants in the study do not believe being a part of this community diminishes one's masculinity, so long as they are committed to being men who treat others with respect. The participants vary in their progressiveness; Some are just beginning to be open to these perspectives, others already support this community, and one advocates on behalf this community even though he do not belong to any of its identities. The degree of progressiveness varies for these participants, but they are undoubtedly presenting progressive masculinity, or are on a journey to it.

Womanizer/Player of Women: "Quality of relationships with women is more important than quantity" –Clark

Sexual conquest of women, by any means necessary, even if by force, is another way in which hegemonic masculinities oppress other identities (Connell, 1995; Lynch 2009). Two of the participants did not mention pursuing multiple sexual relationships with women as essential to their masculinity. The other half were explicitly asked, and when they did speak on the "playa" stereotype, they described it plainly as immature and manipulative. They eschew oppressive expressions of masculinity in their relationships with women. The idea of treating women with respect and dignity, not as sexual prizes or pieces is emphasized by participants who spoke on this theme. Even one participant who reveals he used to believe these types of relationships with women were acceptable but has since then matured. Austin comments on these experiences:

Austin, Individual Intake Interview

"In my circle, all we did was glorify who can get with the most girls, it was a glorified thing, especially being how immature I was…Thinking back on it, the fact that I just did that without any remorse is terrible. That you [he] just manipulated someone's mind like that. Now two years later, yeah, I don't think I could ever go back. That's what it comes down to, you're not a real man, you're just manipulating."

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Though this participant previously held such beliefs about relationships with women, he has experienced growth within himself, which has caused him to want to pursue more healthy relationships with women.

All participants did not comment on this theme, but most did comment on relationships with women. They prioritize relationships with women grounded in ethical and anti-sexist behaviors; holding other men accountable for their actions to prevent and protect women from sexual assault and harassment was emphasized. Clark comments:

Clark, Individual Intake Interview

"If I'm out in public, and man is talking crazy to a woman, I feel as though men in this environment should be the first ones to step up. This also goes to play as far as sexual assault on campus. I'm definitely a person that says, 'no, it's not the victim's fault'. At the end of the day, a certain person made a certain action, and, like, the first person to go to in preventing sexual assault should be men. It should be men checking other men."

Clark positions men as protectors of women, not because they cannot protect themselves, rather because it is how it should be, he believes. Rather than oppressing this identity, and its intersections, the rest of the participants expressed similar beliefs of situating men as protectors of women. The men in this study see themselves as equals, or partners, with women, they do not present themselves in oppressive or domineering positions as it related to women, thus show progressive expressions of masculinity.

Leading the Family and being the "breadwinner": "Real men…provide" –Charles & Clark

Each participant situates the man as a provider and leader of the household; however, they did not situate men as neither the only leader, nor only provider of the family [again, expressing progressive masculinities positioned on equal levels as other identities]. Interestingly, these participants extended family to their friends, peers, and communities in which they are involved. These men assert leading and providing for the family goes beyond financial responsibilities; it means supporting emotionally and spiritually as well. This was not expressed in the literature from which this theme was drawn (Harper, 2004; Harris, Palmer, & Struve, 2011). Clark comments:

Clark, Individual Intake Interview

"When I think of provide, I think of basically serving the family, as you should, providing for those basic necessities, but being there not just financially but also emotionally. It doesn't have to be just from the father position, like from father to children. It could also be from peer to peer."

Other participants in the study echo Clark, for instance, Kwadwo articulates other ways a man can provide for those important to him:

Kwadwo, Individual Intake Interview

"I think that stereotype [real men providing] is more so focused on providing in a family setting, I think the expectation is that the man is the breadwinner, the man has to make the money, you gotta make sure the family is okay. None of those are necessarily bad things, but it's not the only thing that defines you to be a real man. The stereotype usually refers to providing through money, or through a job, but you can also provide in other ways: emotional support, encouraging someone to step outside of

their comfort zone, mental health, helping someone find their passion. Those are all support, for me that's also providing."

Furthermore, as it relates to be the "breadwinner" of the family, none of the participants believe the man must be the financial leader of the household; they express the opposite. Many of the participants commented on current trends of more women in the workforce, which they see as a positive. Charles expresses his opinions on the matter of women making more money than men:

Charles, Individual Intake Interview

"Personally, if my wife made more money than me, I would have no problem with that. At the end of the day, I know I'm gonna be making money myself. The thing is, if we're both making money, it really shouldn't be an issue of who is making more money. We have to kind of realize, it doesn't really matter what the value is as long as you're both putting it in together. So, I say, as long as everybody is getting what they need and getting what they deserve, I have no problem with that."

These sentiments are furthered by the other participants; Kwadwo reflects on a partner who makes more money than him doesn't matter because it means more money for the household. The participants emphasize the importance of partnership; agreement and understanding of how financial and household responsibilities will be taken care of is important, if not the most important factor of financial responsibilities.

Giving Back to the [Black] Community: "I'm really big on helping others and using your time for a cause." –Kwadwo

All the participants expressed an importance for giving back to the black community, but they also emphasized giving back to others facing social injustice. Therefore, I decided to adapt this theme and place "black" inside of brackets. Giving back to various communities in need to create change and a better future for those who are historically marginalized was mentioned by the participants. In continuation of Kwadwo's quote at the start of this subsection:

Kwadwo, Individual Intake Interview

"For manhood, it's like when you reach that capacity in life where you can be self-sustaining, you always wanna help someone that's behind you, you know. You know what it's like, you know the issues black men have been going through."

Uplifting the black community, especially other black men, is integral to his masculinity. This takes the form of critically and constructively challenging others' thought processes and actions, with the goal of helping them grow.

Giving back to the black community, and those communities who were important in helping you reach success was emphasized by some participants as well. Clark when providing examples of real men, says:

Clark, Individual Intake Interview

"[LeBron James] works hard, but also doesn't mind giving back to the communities that help support him to get to that space, so that's definitely a real man to me."

Many of the participants already engage, and are leaders in multicultural student organizations on campus, these organizations include: Black Student Union, Black Caucus, National Society of Black Engineers, Multicultural Engineering Program, Penn State Treasure Board, and various organizations dedicated to international service experiences.

These students show their dedication to giving back to those in need, helping others, and uplifting marginalized identities through their participation in these organizations.

Participants shared stories of in class encounters, interactions with police, and intracommunity happenings as catalysts in their interests in giving back to the black community on campus. In sharing about his reactions to a 'safe space', important to underrepresented communities on campus, being closed, Charles says:

> **Charles, Individual Intake Interview**
> "This is one of the first things I've ever did when I came on campus,
> 'cause I was just like 'this is crazy'. So, I remember I went and talked to a
> reporter for the [student run news organization], and I was talking about
> that. That's actually what got me started in the community, it was just one
> of those things that was so baffling to me."

The participants decide they need to take matters into their own hands to remedy the issues the black, and others marginalized, community encounter on campus. Many of the participants believe the black community needs to uplift itself. Amongst themselves they agree on the idea of using the negativity as motivation to push forward and make circumstances better for themselves and their communities; in other words, to be resilient.

Resiliency: "Be tenacious, [real men] don't take 'no' for an answer." –Austin

All of the participants expressed beliefs of being relentless, tenacious, and resilient. Clark includes being resilient in his top five defining characteristics of a *real* mean. Resiliency can be displayed in different settings. For these participants, a resilient man is someone who does not quit when encountering adversity; he takes negative experiences and uses them as positive energy to move forward. Clark states:

> **Clark, Individual Intake Interview**
> "A real man is resilient. I definitely say a real man is resilient, because,
> and that's something you see all across the board, between any person.
> Trials and tribulations come, and that's somethin' that you can't avoid in
> life. Mentally, physically, or spiritually. For me, in order to say that you
> are a real man, you are someone who just doesn't get hit, and then 'damn,
> I'm never gonna…', and never get back up kinda thing."

Expanding on this point, as he talks about how and why men should not take 'no' for answer. Austin describes how he showed his tenacity when applying for jobs:

> **Austin, Individual Intake Interview**
> "There's been a lot of instances where I didn't take 'no' for an answer and
> it helped me get to a certain place. Even the job I am going to in August, I
> was just relentless, and didn't take 'no' for an answer. There were certain
> jobs I was applying for that I wasn't necessary qualified for, I still did it,
> got close, didn't get it, but it's just that, you just need that go getter
> mentality. Especially in this day and age, especially being a person of
> color that doesn't get stuff handed to them."

In this excerpt, Austin raises an interesting remark about how his masculinity and racial identity intersect, and how they influence his drive to seek out opportunities. He recognizes as a person of color, who faces marginalization in society, he must work harder than others to pursue opportunities and achieve his goals, despite the adversity.

Campus Experience

Two of the previous themes of manhood and masculinity have been most directly impacted by the participants' experiences in social and academic environments; Resiliency and Giving back to the [Black] Community have been furthered as a result of the negative experiences students have on campus.

Resiliency

Participants describe some of their experiences at Penn State to be marginalizing. Clark details interactions with his peers in predominantly white engineering spaces:

Clark & Jevon (Interviewer), Focus Group

Clark: "One thing I've noticed between me and my peers… say, we are working on a project with upper classmen, and we are all new [to the concept], all the white students will be chosen. For the white students, they assume 'this will be a person that is easy to teach,' or the that the white students are easier to catch up to speed. Me being the black student, I'm like, 'well, I also know how to do this.'"

Jevon: "You think they assume you are not intelligent?"

Clark: "Yeah, or not good enough, plain and simple, but, now I kind of like it. I like it because it's like this is when I become the leader of the project, and then they work under me, and I'm like," awwwww, now you gotta do what I say. *group laughs*."

The other participants understand the feelings associated with an interaction such as this one. There was a moment of camaraderie around the mutual understanding of these feelings. This is a prime example of students being marginalized in academic settings on campus. This participant must be resilient to overcome the adversity he faces, to succeed. These are the experiences in which scholars such as Boyd (2017) and Harper (2004) have described where stereotypes permeate the experiences of students, which may hinder their sense of belonging, self-esteem, and academic accomplishment. However, these participants' campus experiences further their grit, and their understandings and expressions of being resilient.

The participants are very aware of how their experiences could affect them, but they choose to not be overwhelmed. They understand oppressive systems are in place, which make it hard to succeed, nevertheless, a certain attitude, or grit, is needed. Charles comments:

Charles, Focus Group

"Yeah, I definitely feel the same about that. It's kind of one of those things [negative experiences] you wanna use as an advantage, 'cause, you know, if you are down or start letting it get under your skin, it's just gonna be one of those things that consistently get to you and get to you. Use it as motivation, it's gonna be something that you can use for positive energy, and then get ya shit done. And, so, that's how I feel about it."

The participants all agree with this position. They understand using these experiences as fuel, rather than a weight, is important to success. Three students are rising seniors, and one is a recent graduate; reaching their final years of college took for them to develop their understandings resiliency. The participants must make a choice; they could succumb to negative expressions of their masculinity --furthering themselves from academic environments because they do not feel they belong-- aligning with the deficit narratives about their success. The other option is to develop healthy coping mechanisms to aid in the successful navigation of marginalization and racism at PWIs.

Giving Back to the [Black] Community

Directly connected with the development of resiliency is giving back to the [black] community, which is one way these men show their resiliency. Students comment on the university's responses to their negative experiences on campus. They agree on Charles' assertion of Penn State's "front" of prioritizing diversity and inclusion. For example, Charles comments:

Charles, Focus Group

"It's certain things within Penn State that just baffles me, because it's just not what they say they are doing [i.e. Diversity & Inclusion Initiative]. I think recently we [The Black Community] have been doing a really good job of pressing them about it, because we are talking to them face to face like, 'look, this is not happening, what you're saying you're doing is not happening'."

Uplifting other black men, the wider black community, and other marginalized communities has become increasingly important for these men as they continue to have experiences of oppressive experiences on campus. They show their resiliency through advocacy for themselves and other communities.

As he discusses the school's reaction to various incidents on campus, such as the active operation of a white supremacist group, Charles details the first incidence on campus driving him to want to give back to the black community on campus:

Charles, Focus Group

"This is one of the first things I did on campus, 'cause I was just like "this is crazy" … That actually got me started into everything in the community, but it was one of those things that was like so baffling to me because I knew about [diversity and inclusion initiative], and I knew about what they said they were tryna to do. But when things come up they just, they act like [Diversity and Inclusion Initiative] is such a policy, but it's one of those things I feel like they do put of a front [i.e. an empty promise]."

These students recognize they are having negative and marginalizing experiences on campus. Because of their negative experiences, they call for effective change for their communities and others. They join and become leaders of various organizations on campus, they speak with administration, and organize programming to support their peers; demonstrating their resiliency and advocacy for positive change.

Implications

Results from this study inform practice, policy, and research on campus in important ways. First, this study reveals the important nexus between the masculine identity development of black male collegians and their experiences on campus. Effective programing and organizations for and by black men to foster candid dialogue on the themes mentioned in this research may prove to be beneficial for these students' success. Black men may exhibit internalized oppression about their maleness (Collins, 2004; hooks, 2004). Aiding black male collegians in discussions related to their beliefs about their manhood and masculinity will help them to understand how their identities are perceived; understanding how they are perceived on campus will allow them to navigate campus environments more effectively. Helping students navigate those internalizations about their masculinity would prove beneficial in these students' journeys to succeed academically.

These discussions may also aid black male students in the pursuit of progressive masculinities, which will aid them in more positive relationships with those around them and overall mental wellness. Collaboration from black male leaders from undergraduate organizations and black male faculty, staff, and administration to create spaces, where black male collegians can discuss and identify issues specific to their race and gender will allow them to begin to address and remedy those issues.

Second, campus policy makers dedicated to improving upon the experiences of black male collegians should seriously take into consideration the opinions of black male students when creating policy targeted specifically towards them. These policy makers should also consider the impact innovative curriculum based in areas such as identity development and diversity and inclusion will have on the entire university community. Education on these matters will improve the experiences of students from all backgrounds. Core curriculum in areas of identity development would allow all students to address their beliefs about their development, which will inform how they navigate their experiences on campus as well. This curriculum may prove beneficial for male students, as understanding expressions of masculinity may relieve issues of sexual assault on campus. Curriculum on matters of diversity and inclusion addressing issues of implicit biases, stereotyping, and marginalization may teach majority students about their tendencies to marginalize other students. This will ultimately improve upon the experiences of all underrepresented students on campus.

Third, further research on the experiences of black male students' understandings of their masculinity on college campuses have the potential to assist educational researchers and practitioners in academic achievement and retention for black male collegians. How black men see themselves on campus will inform how they navigate those environments (Harris, Palmer & Struve, 2011; Harper & Davis, 2012; Pelzer, 2016). Supporting black male collegians in associating themselves with academic and professional success may counter the deficit narratives about them, which will aid those BMC who struggle to reach graduation.

Conclusion

How black male students negotiate their identities informs how they navigate higher education institutions. These students must confront low expectations and stereotypes --and their effects, such as marginalization--, and address potential negative internalized beliefs about their own abilities. Because of their negative experiences on campus, and the deficit narratives about their achievement, black male collegians may succumb to negative expressions of their masculinity aligning with those deficit narratives about them, or they may develop coping mechanisms in order to address their negative experiences, in order to excel at higher education institutions. Aiding these students in understanding their identities as black men, and how this identity functions at PWIs may lead to more trends of success for these students.

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"Perceptions and Impact of Solar Energy in the Context of Philadelphia"

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Corey Crews-Williams, McNair Scholar, The Pennsylvania State University

McNair Faculty Research Advisers:
Jeffrey R. S. Brownson, Ph.D.
Associate Professor of Energy and Mineral Engineering
Department of Energy and Mineral Engineering
College of Earth and Mineral Sciences

Nicole Webster, Ph.D.
Associate Professor of Youth and International Development
Department of Agricultural Economics, Sociology, and Education
College of Agricultural Sciences
The Pennsylvania State University

Abstract

In all its greatness, Philadelphia continues to struggle with poverty. To properly address such issues, we must first understand the value system of our stakeholder community. This entails engaging with the people of the community to thoroughly understand their beliefs, desires, and disparities. In the context of Philadelphia, I want to understand the perceptions of solar energy and the impact new methods of energy have on a community. The methodology to achieve this is one that includes productive conversation. This project will include the results of surveys/interviews conducted with Philadelphia stakeholders who attended the Philly Green Ambassadors Orientation held in West Philadelphia.

Understanding such constituents will lay the foundation for a socially equitable future. As these results are illustrated, we will be able to enable Philadelphia communities to have better access to clean energy sources by having projects that are more compatible with their diverse cultural systems.

Introduction

A socially equitable future is more achievable for disenfranchised communities like Philadelphia once barriers to renewable energy are overcome. Perceptions of new energy methods must be properly analyzed to ensure programs/initiatives that have the intent of encouraging such methods achieve long term success. This makes it vital for engineers who work in the community development field to know how to properly engage with their stakeholders and apply the knowledge gained to project design. Highlighting the impact that the renewable energy industry has had thus far on your community can be used as an aide for educating people on the benefits of such systems. This research paper will be focusing on the perceptions of solar energy in Philadelphia to discover what existing barriers prevent residents of Philadelphia from gaining access to clean energy.

Furthermore, this paper will address proper ways of engagement to extract necessary information from the stakeholder community. Solar energy can be used as a vessel for community development but only when the interests of the community are included in the design process of solar energy programs and initiatives. The benefits of this energy method are exemplified through developing communities internationally.

The city of Philadelphia, located in southeastern Pennsylvania, is home to over 1.5 million people (2018). This city, rich in history and culture, is home to the Liberty Bell and was once the capital of our nation. In addition to these great features, this city is also home to the Philadelphia Eagles, the 2018 Super Bowl champions. In a unique way, this city encompasses a plethora of cultural values and views that differ from neighborhood to neighborhood. From fashion to food, the interests of such an urban context are expressed in the fabric of its built environment. An important thing to note is how different this city is from others. Mention specifically how it's different from other cities

Juxtaposed to these beautiful features are conditions that exemplify Philadelphia's issues with poverty. Philadelphia, like most large cities, has trouble with crime, homelessness, unemployment, and pollution. Each of these downfalls pose a significant threat to the city's natural resources. At a poverty rate of 26%, Philadelphia remains the poorest of America's most populous cities according to the 2018 Pew report (U.S. Census Bureau, 2018). Economically, Philadelphia shows continuous improvement, but social measures do not reflect this progression. Although the city adds 715,900 jobs each month on average, approximately 400,000 residents still live in poverty. These conditions are exemplified in poor health, housing, and in many other ways. The effects of poverty are most felt by communities of color. Latino-Americans and African Americans experience the highest rates of poverty at 37.9% and 30.8%, respectively (U.S. Census Bureau, 2018). Issues related to poverty can be addressed in numerous ways. This research project will address these issues through the lens of energy poverty. Currently, there is a lack of access to clean and renewable energy sources. Furthermore, the city's current energy methods contribute to the pollution of vital resources that support the community. Disenfranchised communities experience the worst effects of these malpractices even though they contribute the least.

Although much effort and resources have been spent supporting the remediation of these circumstances, there is still tremendous progress to be made. Currently in Philadelphia, there are many projects, programs, and initiatives that are underway that have a mission of making renewable energy more accessible and applicable in urban contexts. The organizations that guide such endeavors consist of professionals and scholars from various fields of academia. Some initiatives are led by those with backgrounds in social or political sciences, while others may lead with a background in stem fields. As an Energy Engineering student, this research project will be conducted through the lens of an engineer. To have a successful project, engineers must be inclusive to the value system of their clients. As previously mentioned, the diversity of Philadelphia is accompanied with a variety of views and opinions toward solar energy. This makes it necessary to have proper and ongoing engagement with your stakeholders. A benefit of doing this is the possibility of discovering latent needs. This entails providing solutions to clients for issues that were previously overlooked. The skills and experience needed for this type of engagement are non-traditional to the engineering discipline.

Methods

Participants.

        The participants of this study are community members and leaders from Philadelphia who attended the Philly Green Ambassadors event held by Overbrook Environmental Education Center in West Philly. In total, participants were a convenience sample of thirty-six individuals who range from ages 18 to 72. Demographically, the key characteristics that the survey focuses on are household income level, race/ethnicity, and gender. There was no inclusion or exclusion criteria for this engagement.

Procedure.

        In this study, participants were asked a series of questions on their understanding and perspective of solar energy using a survey. The survey, as seen in Table 3.1, consists of 17 questions that are multiple choice, check-box, open-ended, and Likert scale questions. A purpose statement is provided at the beginning of the survey to provide background on the researcher and the intent of the research project. The first section of the survey has demographic questions that include race/ethnicity, gender, and household income level. These questions served as the variables of this study. More specifically, this study took a closer look at the results of the survey in relation to race and household income level. As for the rest of the survey, there are two multiple choice, four checkbox, two open-ended, and four Likert scale questions. Each of these questions address the awareness, behavior, and/or perceptions of each participant regarding solar energy:

- Awareness: Questions 7, 9, and 17
- Behavior: Questions 11, 14, and 15
- Perception: Questions 9, 10, 12, 13, 16, and 17

Table 3.1: Survey Questions

Question Number	Question
Question 1 (Written Response)	Name and Email
Question 2 (Written Response)	Neighborhood/City
Question 3 (Multiple Choice)	Household Income
Question 4 (Written Response)	Age
Question 5 (Checkbox)	Race/Ethnicity
Question 6 (Multiple Choice)	Gender
Question 7 (Multiple Choice)	Have you heard of solar energy before?
Question 8 (Checkbox)	If so, where?
Question 9 (Checkbox)	Solar energy can be seen as power from the sun. What does solar energy mean to you?
Question 10 (Checkbox)	Solar electricity is electricity that comes from solar power. Where do you see solar electricity being used in your community?

Question 11a. (Multiple Choice)	Have you considered solar electricity for your home before
Question 11b. (Written Response)	Please explain why or why not.
Question 12 (Checkbox)	Select the top 3 barriers that prevent you and other people from gaining access to solar energy in your community.
Question 13 (Likert Scale)	Rank how much you agree with the following statements: Solar energy has positive benefits for a community.
Question 14 (Likert Scale)	If solar electricity was cheaper, I would be more likely to consider it for my home.
Question 15 (Likert Scale)	I would attend a seminar to learn more about solar energy.
Question 16 (Likert Scale)	Solar is important for the sustainability of urban communities.
Question 17 (Written Response)	What are better ways of introducing solar to your community?

Surveys were distributed in paper format at a community event held in West Philadelphia by the Overbrook Environmental Education Center. If asked, a more elaborate explanation on the background of this research project was provided by the researcher. Participants were informed that if they were to provide their names, they would not be used in the research without consent. The surveys were also sent electronically to community contacts to be further distributed to residents of Philadelphia. There were a variety of incentives to encourage representatives to attend the event. These incentives included gift cards, free t-shirts, and community resource bags.

Measures/Materials.

The survey was generated using Google Forms. This format allowed the questionnaire to be distributed online and in paper format. They were distributed electronically and in paper format. The survey consisted of multiple choice, checkbox, and short answer questions. These questions were developed with the influence of community leaders in Philadelphia for clarity purposes.

Analysis.

The primary factors considered during this research are the intersection between energy and culture, perceptions of solar energy in minority communities. The secondary factors considered for this research highlight attitudes regarding whether people are optimistic or pessimistic towards the future of solar energy. The responses have been analyzed at the individual and collective levels to understand the underlying needs of the community and its members.

Literature Review

Literature reviews help to establish the importance of a topic and serve as entry points into ongoing conversations for different fields of research. To gain a fundamental understanding of community engagement in Philadelphia and the potential impact solar energy can have in this environment, a review of literature was conducted. To begin, this understanding entails studying the societal conditions and value system of Philadelphia. This city is unique and so are the people that live there. This city has a strong culture and their perspectives towards any and everything must be considered to understand who they are. Furthermore, previous methods of engagement must be analyzed and understood to make sure that the same mistakes regarding engagement aren't repeated.

Energy Poverty.

Poverty in the context of Philadelphia is exemplified in numerous ways. One form of poverty, and the lens of this research project, is energy poverty. Energy poverty refers to inadequate access to clean, affordable, and reliable energy sources that promote sustainable growth (McCauley, 2018). Those that suffer the most detriment from fossil fuel use are disenfranchised communities and communities of color although they contribute to carbon emission production the least (McCaughley, 2018). These conditions pave the way to injustices that especially plague developing nations worldwide. This phenomenon is very apparent in the city of Philadelphia, and so it is crucial that right steps are taken to begin mitigating such poverty.

In Philadelphia, those with moderate to high income backgrounds make up most residential solar owners. Being that solar is an expensive investment, it can be expected that those who are wealthier will have greater access to solar energy initiatives and programs.

Renewable energy can serve as a catalyst for community development and economic growth in disenfranchised communities. In urban communities across the United States, the positive effects of using renewable energy sources are very apparent. Regarding Philadelphia, there has already been a tremendous amount of effort towards establishing a framework for solar energy implementation throughout the city. The analysis on the effects of solar energy in urban environments entails showing the impact of renewable energy on health, education, and employment. The potential of solar energy to eradicate poverty in North and West Philadelphia is prevalent but not utilized. By incorporating this type of energy system in under resourced environments, stakeholders are in more control of their resources, thus strengthening their power on the development within the community. These energy systems, when guided by members of the community, encouraged others within the same environment to take initiative in doing the same.

Culture & Energy.

In the human experience, energy and culture are inseparable. The methods of energy that people use on a day to day basis, whether it be for cooking, lighting, or electricity production, are deeply rooted into the culture of the people. The first steps to understanding this dynamic relationship between culture and energy is to consider the historical perspective of energy transitions for a specific environment. The use of fossil fuels is so deeply integrated into our society that they have become a cornerstone for societal and economic growth. The over reliance on such energy methods has made our society, no matter rural or urban, more and more vulnerable to the negative effects it creates (Dooley, 2006).

The lifestyle that has been created from the use of fossil fuels has not only proposed many negative effects on health and environment, but also binds us to its use, creating an unhealthy dependency that is hard to break (White, 1943). The cultural significance of energy use in Philadelphia guides the perception and impact of traditional and alternative energy sources. This leads us to ponder how we must either change our consumption culture to that of which is more accommodating to renewable energy implementation or acclimate renewable energy technologies to better serve the consumption habits. This is not a black and white approach but more so invites an agreement to meet in the middle. To make progress in aligning culture and energy with sustainable development, there must be dialogue on what exactly is affected by converting to renewable energy resources.

In Philadelphia, this dialogue has already begun. The Philadelphia Energy Authority is an independent municipal authority that has the responsibility of developing energy projects, policy, and educational programs for sustainable development in Philadelphia (Philadelphia City Council, 2016). One of their initiatives is the Solarize Philly program. With this initiative, residents of the city are encouraged to purchase residential solar for their homes by enrolling in a group buying program. As more people enroll, the discount on the solar installation becomes greater (Philadelphia Energy Authority, 2018). This program has brought many benefits to the city including significant job growth and additional solar capacity to decrease pollution. Unfortunately, involvement in this initiative is low amongst low-income communities due to the high cost to participate. As this is the case, the approach for providing solar to residents from a lower socioeconomic status must be changed. This leads us to explore alternative ways of solar implementation and investigate what obstacles may still be present for members of the community.

Unforeseen barriers for solar energy implementation are often barriers that are associated with the value system and community conditions in place. These barriers can be explained as cognitive barriers, meaning there is no awareness or interest from the general public due to a lack of proper engagement and/or presence of solar energy (Dooley, 2006). These factors may not be properly understood but are critical to the process of designing a more applicable program. Contrary to traditional engineering thinking, the underlying factors that influence residents from low-income backgrounds to purchase solar make the design of the solar program unique.

Community Development & Engagement.

There are various ways to successfully engage in a community when it comes to starting dialogue around solar energy interpretation and application. In addition to understanding the value system of a community and the influence this has on solar energy perceptions, we must also consider previous acts of engagement in Philadelphia and the impact this has had on the community. How does one engage in communities of color and disenfranchised communities? Why is it important to understand the value system of the community before we engage? These are questions that act as a foundation for discovering how to have ongoing interactions and conversations in Philadelphia. In *Pushing Back the Gates* by Harley F. Etienne, these questions are addressed from the university perspective. College institutions in Philadelphia have a long history of engaging with their surrounding community. The history of interactions between these entities has not always been positive. In theory, the relationship between college and community, especially for community development, is one that should be symbiotic however, this is not always the case. This disconnect between community and the entity engaging the community.is not shared solely with universities but also with professional entities i.e. engineers, non-profit, organizations, volunteer programs, etc.

The lack of understanding in conjunction with poor remediation for unsuccessful projects creates a sense of distrust between the community and community entity intending to help (Etienne, 2012). Building that sense of trust is essential for current projects and those to follow.

Co-Production of Knowledge.

Issues of energy poverty can be explained through the lens of various academic backgrounds. Deeper understanding makes it critical for those working in the community development arena to be able to work with people from different fields of academia. Understanding the many facets that go into implementing renewable energy in foreign environment enables engineers to be broader in the solutions they decide to develop. Thoughtful programming therefore requires an interdisciplinary approach to fundamental engineering studies. An inclusive suite of topics such as social sciences, communication, and stakeholder engagement might be included. An integrated approach may come by way of coursework or by working in interdisciplinary teams where each person brings a unique expertise to a project. For Philadelphia, this means modifying the approach of solar engagement in a way that is inclusive to the interests and abilities of people from different socioeconomic backgrounds. The champions of community engagement are those who are well versed in a variety of disciplines with a basic understanding of the importance of engaging communities properly. However, much more progress can be made as a team rather as an individual.

Results

The preliminary findings of this research will address the demographic questions from the survey. The significant results will follow the same order as the questions presented in the survey. The survey consisted of 17 questions that address the awareness, behavior, and perceptions of solar energy from Philadelphia residents. The purpose of capturing these perspectives is to improve methods of community engagement, especially regarding solar programs and initiatives to be implemented in Philadelphia. As previously mentioned, the culture and value system of a community must be thoroughly understood prior to dropping technology in their environment. Projects and initiatives fail without doing so because there is a lack of compatibility between the interests of the community and the design of the solar project. By having a greater consideration for the latent needs of the community, projects will have a better chance of long-term success.

Neighborhood/City.

The participants of the survey were mainly from Philadelphia. As seen in Fig. 4.1, the residents participating were predominantly from West Philadelphia (50%) with a smaller representation from North Philadelphia (25%). Participants of survey labeled as "Other" were residents from outside of the city, such as Wynnefield and Washington D.C. Three participants lived outside of North and West Philadelphia including: Northeast, Northwest, and Center City.

Household Income.

As stated before, the focus of this research focuses on residents from low to moderate-income backgrounds. The levels of income that participants could choose from can be seen in Figure 4.2. The poverty line for a family of four is $25,000 according to the U.S, Department of Health & Human Services (U.S. Department of Health & Human Services, 2018). Fourteen percent of the participants have a household income of less than $20,000. This indicates a considerable number of participants who are below the poverty line. In addition to this, 19% of participants remain in the $20,000 to $34,999, indicating that their household income is relatively close to the poverty line. These features further emphasize the low-income status in Philadelphia communities.

As for other household income levels, there is an even split between those who have household incomes above and below $50,000.
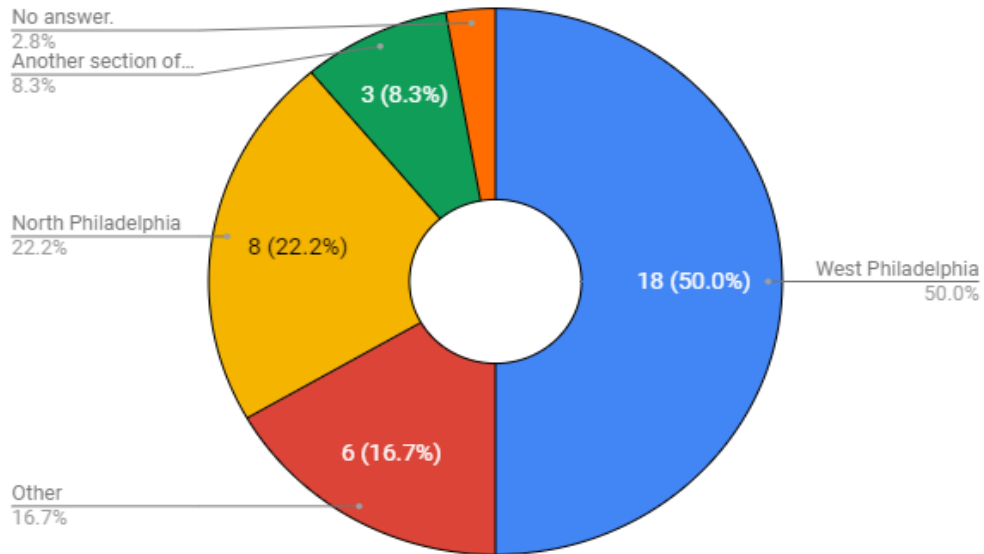

Figure 4.1: Neighborhood/City: 91% of the participants were from Philadelphia: 22% from North Philadelphia and 50% from West Philadelphia. One participant preferred not to answer. This question had 36 responses.
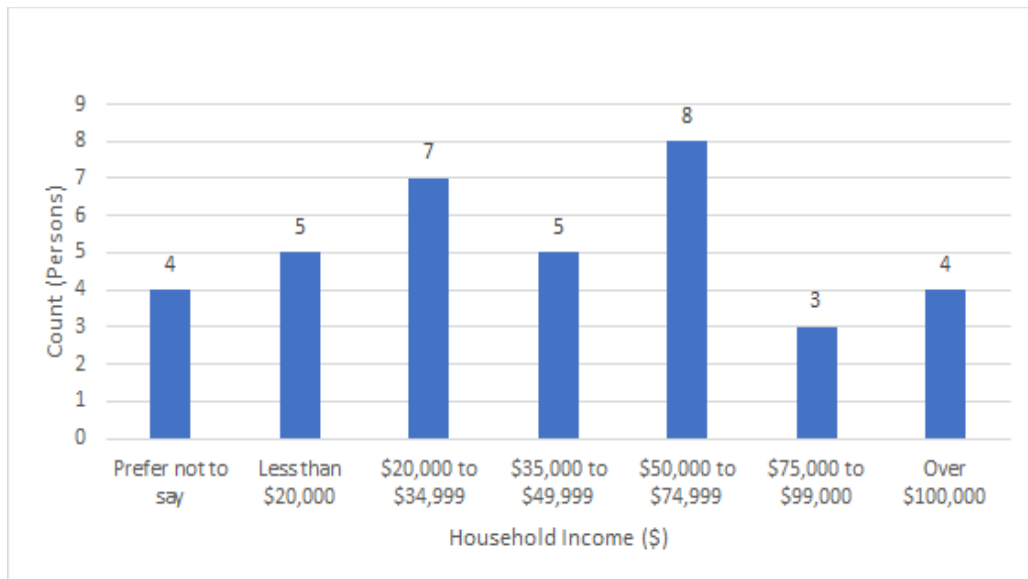

Figure 4.2: Household Income: This question had 32 responses. Individuals who did not respond were placed under Prefer not to say, thus making the total count 36. The most common household income level was the $50,000 to $74,999 range.
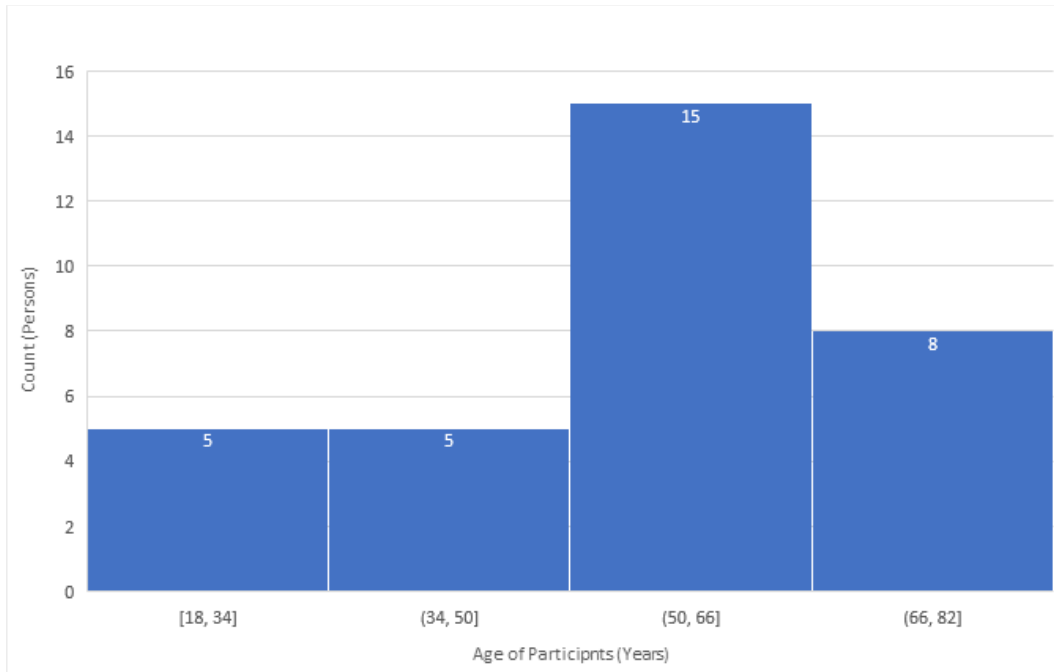
Figure 4.3: Age: Three participants did not provide their age. The youngest participant was 18 years of age. The eldest participant was 72 years of age. The average age of participants was 55. This question had 33 responses.

Race/Ethnicity & Gender.

As displayed in Figure 4.4, 32 out of the 36 participants were African-American. One participant identified as Hispanic or Latino. The ethnic spread of the surveys proved to be very beneficial for the results as the goal was to obtain the perspective from such groups. As previously mentioned, it is communities of color and low-income communities that experience the worst effects of resource mismanagement although they contribute to it the least. In this respect, resource mismanagement alludes to a lack of regard for the protection of natural resources: food, water, and energy, especially in the communities considered for this research. With this being known, it was important that the participants of the survey be from communities such as these to ensure that the results were representative of their interests.

As seen in Figure 4.4, most of survey participants were female. They made up 89% of the participants while males were only 8% of the participants.
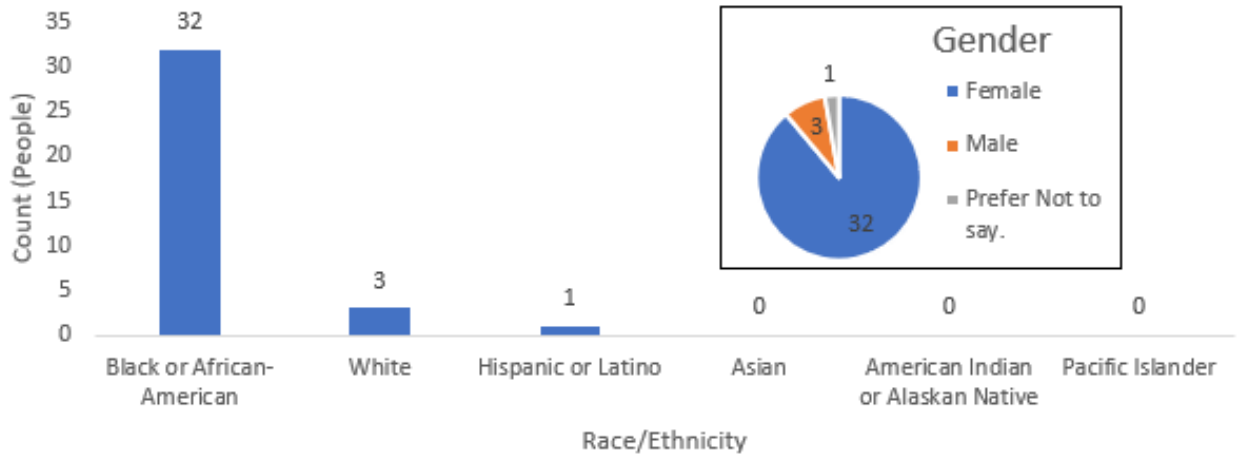
Figure 4.4: Race/Ethnicity and Gender. Race/Ethnicity: 91% of the participants were African-American. 9% of the participants were White. 3% of the participants were Hispanic or Latino. There were 36 responses to this question.

Solar Awareness.

The participants of the survey unanimously answered yes to if they had heard of solar energy prior to the survey. The purpose of this question was to establish an understanding of how familiar residents of Philadelphia are with certain terminology. Seeing that all the participants have heard of solar energy before, one can infer that solar energy is a familiar term in Philadelphia communities. Furthermore, it is important to know from where this familiarity is derived. Participants were also asked to provide where they had heard of solar energy. The top three sources as to where they heard about solar energy were TV commercials (49%), Internet (43%), and Family/Friends (40%). Each percentage correlates to the number of participants that selected the source as an option, explaining why the percentages do not add up to 100%. These results are also displayed below in Figure 4.5. Although TV and Internet are the best resource for information regarding solar energy, word of mouth from Family/Friends was the most common form of communicating about topic in Philadelphia.
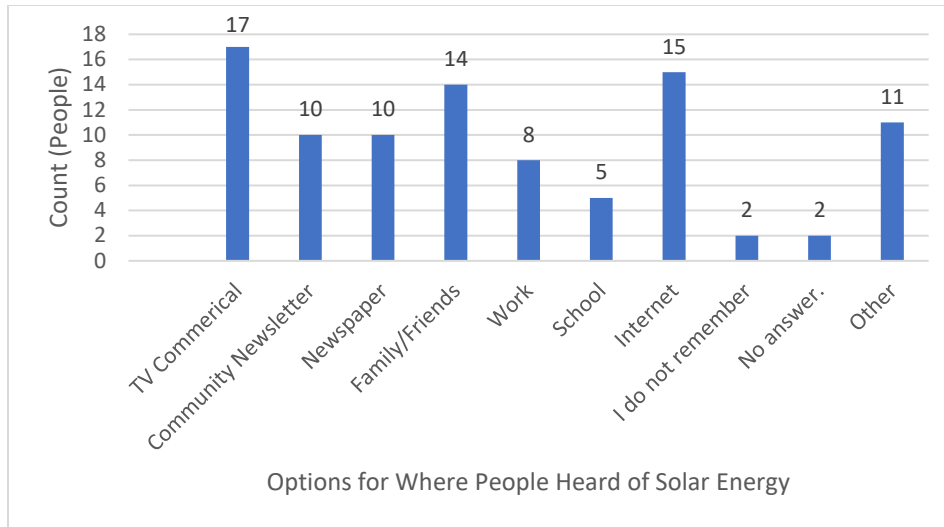
Figure 4.5: Where have you of solar energy?
The most chosen option was TV Commercials. The least chosen option besides "No answer."
and "I do not know" was School. There were 35 responses to this question.

Survey Synthesis.

Based on discussions held at the event and the survey results, one can conclude that the peer to peer passing of knowledge is very effective and applicable to urban environments of Philadelphia, specifically within North and West Philadelphia. This method of communication can be capitalized upon to increase solar energy awareness by placing a larger emphasis on the importance of communication within the community. It is through this communication that a logic of collective actions is created. This entails a consideration of joint welfare as opposed to individualistic efforts for shared goals (Ostrom, 2015). Improvements in collective communication can be achieved by better facilitating community events and seminars where solar energy topics are discussed. Furthermore, this encourages co-production of solutions as more than one perspective is being captured.

One thing learned from participating in the Philly Green Ambassadors Program is that despite one's socioeconomic background, people still have ongoing access to the internet in some form or fashion. Where people access the internet was not asked in the survey but knowing that this is a valuable source for information in general can encourage the creation of better solar education tools. Furthermore, there are ways to create avenues of communication that encompass peer to peer interactions and the use of internet.

Question 9 addressed what people interpreted solar energy to mean with the basic understanding of solar energy being power from the sun. The most chosen representation of solar energy from the participants were natural heating (72%), natural lighting (72%), and solar panels (72%). These responses highlight what people's initial thoughts are regarding solar energy. They also serve as a starting point for understanding how we should educate people on solar energy. There was a total of 7 options for different meanings of solar energy. One of these options was "Other", allowing participants to write what solar energy meant to them. With a lack of solar options in Philadelphia, it was anticipated that natural heating, natural lighting, and solar panels would be the most apparent interpretations of solar energy in the city. Another point for consideration is to see which solar meanings were chosen the least.

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This highlight can expose which methods of solar energy are least relevant in Philadelphia. This will also help to guide how community agencies propose solar initiatives. To further understand the interactions residents of Philadelphia, have with solar, another question was asked on the presence of solar in the city. In the survey, solar electricity is explained as electricity that comes from solar power. An electronic device converts sunlight into electric current, then sends it to a grid or battery for storage (Brownson, 2014. The applications of solar electricity greatly range. When asked where one sees solar electricity being used in their community, most respondents indicated that they have seen rooftop solar for homes and street lights in their community. Thirty-one (31%) of the responses indicated that they don't see solar electricity in their environments. The visual presence of solar electricity has a strong influence on what solar means to people. Representation serves in some ways as a definition to the technology. As the presence of solar options increases, people of the community become more familiar with its applicability to their lifestyles. The need for this presence was reiterated in discussions at the Philly Green Ambassadors Orientation.

To discover how people of Philadelphia feel about the applicability of solar to themselves, it was found that 75% of the participants have considered solar electricity for their home. The most common reasons for considering solar are as a form of energy is to save money by reducing electricity bills costs and it being a good investment for the environment. Although people may understand electricity produced by solar power, one cannot assume that they've considered it for their home. In opposition, those who did not consider solar expressed that they were not property owners, did not plan on living in their home for too long, or did not know enough about it. Consequently, these reasons discourage stakeholders from having an interest in solar energy. If we can remediate some of the reasons for opposition, it will be expected that people will have a higher consideration for solar. To begin remediation, we must first unpack the barriers that prevent people being more conscious of solar energy.

For Question 12, participants were asked to select the top barriers that prevent them and other people from gaining access to solar energy. These barriers are obstacles that discourage Philadelphia residents from implementing solar energy technology in his/her community. Finances was perceived as the highest barrier to solar access. Finances as a barrier entails solar energy being too expensive or too hard to finance. This barrier was expected to be salient in this research as the price of solar energy is a contested topic at the national level. To help bring this cost down, the Philadelphia Energy Authority has proposed a program where homeowners can enlist in a discounted solar installation program for their home. Unfortunately, even with this initiative in place, residents, especially from low-income backgrounds, still struggle to gain access due to the financial burden still being too large.

The second most selected barrier was Education/Awareness. For the survey, this barrier was explained as a lack of knowledge on solar energy options. This barrier is significant because it is directly correlated to how people perceive what solar energy means. As previously mentioned, there are numerous ways to introduce solar energy into a community whether it be through residential solar, community projects, or education programs for youth. To improve how people, adapt to these methods, they must first understand what they are.

The third most selected choice was Lack of Solar Resources. A lack of solar resources is not in regard to the amount of sunlight being provided in Philadelphia. It refers to a diverse application set of solar technologies i.e. residential solar, solar-powered street lights, and solar community projects. If options for solar implementation are not available, this limits the applicability of solar for Philadelphia residents. A person can be aware of different solar options although they are not present in the community. A lack of awareness for solar opportunities creates a detrimental disconnect as the lack of opportunity for solar engagement discourages residents of Philadelphia from partaking in solar initiatives. Opening more avenues for solar are the preliminary steps for a community to take on more initiatives, inspiring a positive momentum for sustainable development.

Questions 13-16 of the survey were Likert questions where participants were asked to rank how much they agreed with the statement provided, 1 meaning disagree, 5 meaning agree, and therefore 3 representing neither. The first statement, "Solar energy has positive benefits for the community." Seventy-eight (78%) agreed completely with this statement while 14% somewhat agreed. The second statement, "If solar electricity was cheaper, I would be more likely to consider it for my home." Seventy-two percent of participants agreed to this statement while 19% were neutral. The significance of being neutral to this statement is linked to the earlier question of if people have considered solar for their home. Even when the cost of solar energy is not a factor, there are other conditions that dissuade people from pursuing solar. Eighty-one percent and 16% of participants respectively either somewhat agreed or were neutral to the statement "I would attend a seminar to learn more about solar energy.". The response to this statement highlights the willingness of Philadelphia residents to learn more about solar. Participant responses reveal that although solar energy is something that may be familiar, they are open to taking the steps to learn how it may be more applicable to their lives. The fourth statement, "Solar is important for the sustainability of urban communities." Sixty-four percent of participants agreed with the statement while 19% were neutral towards it. Overall, the responses show that stakeholders from Philadelphia are generally optimistic towards solar.
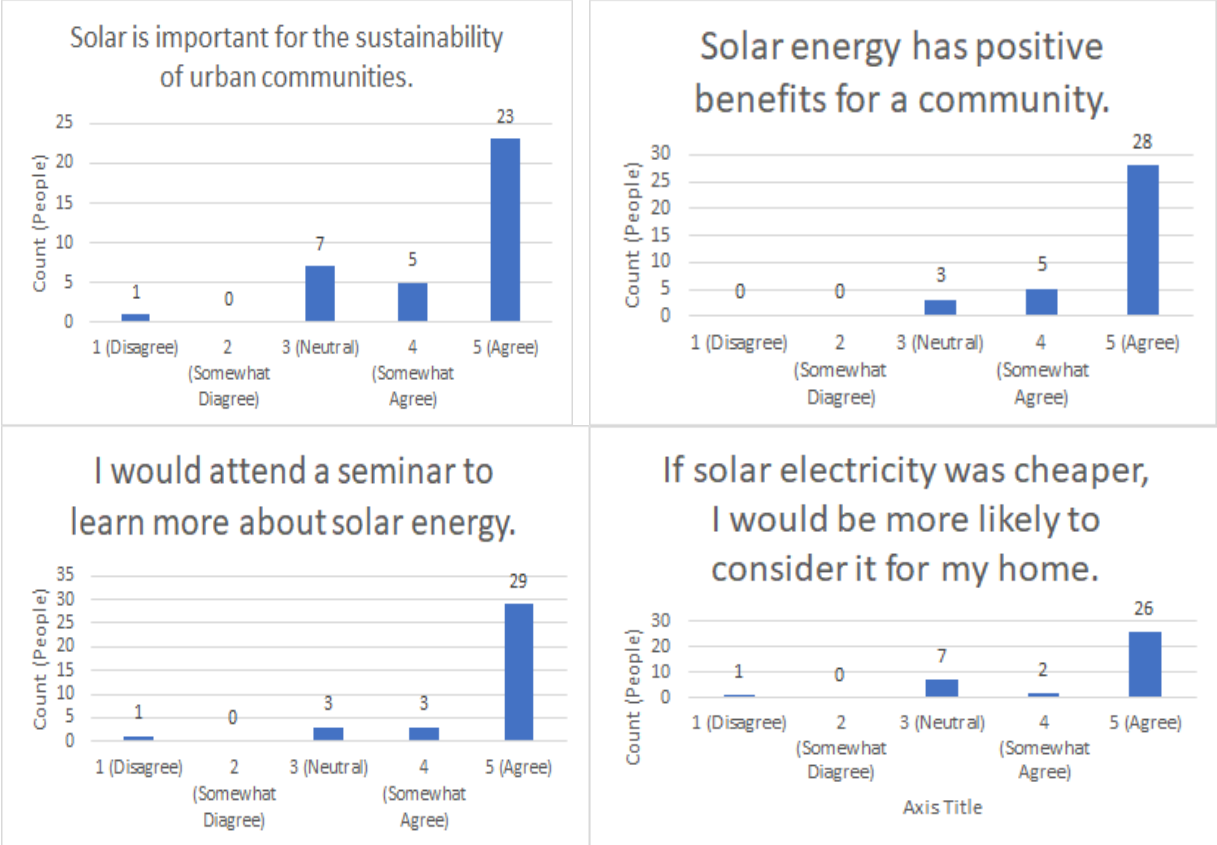
Figure 4.6: Likert scale questions. Y-axis: Count (People); X-axis: 1-Disagree, 2-Somewhat Disagree, 3-Neutral, 4-Somewhat Agree, 5-Agree.

Question 17 allowed people to write in what they thought were better ways of introducing solar to their communities. The overwhelming recommendation in this section was to have community meetings and/or workshops focused on learning about solar energy applications. Based on the responses from the survey and my discussions during the research engagement event, community meetings/workshops entail having in-person observations of solar panels in use on a home or other practical application. Two people suggested to have a presentation at the Civic Association Meetings on solar energy methods. Philadelphia Civic and Neighborhood Associations, are organized groups that work to keep their community informed (The Philadelphia Citizen, 2018). Overall, the responses from this question alluded to improving solar education and representation in their neighborhoods. Proposed ways to do this include having solar workshops or seminars at common meetings places for community members. Being able to see an active solar energy system seemed to be a viable way of educating Philadelphia residents on solar energy.

Discussion

Solar Energy Perceptions.

        Based on the results, one can see that there are many avenues for engagement that will help communities in Philadelphia to be better informed of solar energy and how it applies to them. The first point to consider is that of education. This includes an understanding of what different solar resources are in the most simplistic manner. The aim is to shift thinking of solar as natural heating and lighting to a perspective that is more encompassing of solar technologies that can be used to improve their community. This education can come by way of community seminars, workshops, or other focal points for the community such as Civic Association meetings or local library events. However, even these avenues for education engagement come with speculation. How solar energy is proposed at these events always plays a large factor in people's understanding of the topic. Given this, there should be an investigation of potential communication barriers, especially with regard to solar terminology. Overall, solar energy has a bright future in Philadelphia. Based on the results, one can infer that residents of Philadelphia are very optimistic and open toward solar energy implementation. This optimism should and will be used to fuel solar engagements.

        Perception of solar energy is also influenced by presence. The ability to see solar technology being used, whether it be residential or in a community format creates a sense of comfort for residents of Philadelphia as they grow a familiarity with its application. In informative seminars or workshops for solar programs and initiatives, it would be beneficial to provide tangible products and hands on demonstrations for attendees.

Neighborhoods of Philadelphia

        As the results indicate, participants of the survey were from various sections of Philadelphia. The most represented sections were North and West Philadelphia. These two sections of Philadelphia serve as points of interest for this research due to their high levels of poverty. Although the West and North sections of Philadelphia are separated from one another, they have very similar characteristics as poverty-stricken environments. The conditions of poverty that they experience as aforementioned includes concerning levels of unemployment, pollution, and substance abuse (Pew Trusts, 2018). The urge to make these communities better is exemplified by the presence of representatives from these communities at events like the Philly Green Ambassador Orientation where they can gain resources that will help to make their environment better. In other words, the representation from North and West Philadelphia highlight a sense of civic engagement unique to these communities. The presence of community members from these sections signify the commitment such stakeholders have in improving their environment.

Women in Community Development of Philadelphia.

        Most participants for the survey were women. This difference in gender was very apparent at the Philly Green Ambassadors Orientation. Based on the survey results and discussions held at the GSA Orientation, one can infer that women are integral to community development initiatives of North and West Philadelphia. At the event, women were the most vocal in creating solutions for community issues. This was an observation made while at the event. A female perspective was also true regarding the written responses provided in the surveys. Responses from women were more elaborate compared to those from men although there were not many responses from men. These women were block captains and representatives from community agencies. Block captains are the first level of local leadership for communities in Philadelphia. These positions may be assumed by someone who is heavily engaged in their neighborhood or by election. The significance of having their input in the surveys is that they directly engage in communities of interest for this research and are neighbors of residents to those who experience energy injustices.

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When engaging in Philadelphia, block captains can serve as a good point of contact for beginning to learn about the community. Their perspectives and expertise of the community is unique since they live within the communities that are a focal point for this research. This is different than engaging with community leaders who are engaged within Philadelphia communities momentarily.

Furthermore, this dynamic suggests that women may have a higher regard or understanding of disparities within their community. Strong representation of women in the results also suggests that women are more knowledgeable of the resources needed to build the community. During the event, Philly Green Ambassadors Orientation, a range of topics were covered such as climate change and renewable energy to pest and storm water management. Each of these topics served as good focal points for the attendees to. Being that women were the most represented at the event, they had more information that could be redistributed in their communities.

Intersection Between Race, Income, and Solar Energy Perceptions.

To get a better understanding of the perspectives of solar of people specifically from low-income backgrounds and minority backgrounds, the results from participants who were African-American and had an income range of less than $20,000 or $20,000 to $34,999 were more critically analyzed. The reason for their importance is due to these income levels being the closest to the national poverty and serve as a formidable starting point for analyzing the impact of solar specifically in this community. For this group, who make up 12 of 36 participants, the trends of responses were very similar to the results of the surveys overall. Participants from this demographic were all African-American and female. The average age was 48 and eight of the participants were from North and West Philadelphia. The responses from this specific group were very aligned with the total response from the survey. They had drastically similar perspectives of what solar energy meant to them and where they saw it present in their communities. The only nuance noticed was that there was a slightly larger emphasis on education for solar energy and a lesser acknowledgement for a lack of solar resources. This nuance was apparent in the responses for Question 12 and in Question 17. This difference in perspective shows that in order to engage and assist these communities in their development, the first focus should be towards how to convey solar energy is presented in a clearly understandable and engaging manner. Furthermore, based on the results from this group, one can conclude that pilot programs would be the best way to engage individuals from low-income backgrounds. With education as a starting point, environmental groups can focus on scaling up efforts and making the best use of resources for community engagement.

Conclusion and Perspective

Although the approach for implementing solar energy in Philadelphia is unique, the framework is built on proven. Every location harbors a unique set of values and beliefs that influence how they perceive new technologies. The knowledge gained from this research project will help to transform methods of community engagement for implementing solar technologies. For engineers, this entails bridging the gap between their discipline and that of the social sciences. This adjustment will encourage more successful projects as engineers better incorporate the value system of their clients into project design.

The information gained from the survey responses must be properly assessed and understood before considering further steps. The purpose of this research is to take these responses and reproduce them in a way that is inclusive to the community and professionals working in this space. By returning what people said in this way, trust with the community is built. As earlier discussed in the literature review, this sense of trust is essential to the ongoing development of successful projects within Philadelphia. The truth is that we are not helping the community but rather revealing the present existing strengths and opportunities. There is rich potential in these communities to develop solar, however, it takes a collective effort to unfold feasible opportunities. This research attempts to bring light to this potential and provide avenues to bring solar ideas to fruition. As a Philadelphia native, I thought it would be important to highlight some of the disparities that residents of the city experience and use my academic background to address these disparities. In the community development arena, it is unfortunate that communities are taken advantage of for learning purposes without successful change within their community. In doing this research I've realized that it is crucial to always have some sort of return segment that will better help that community that has opened their doors to me.

This research is just another step in the right direction for understanding the latent needs of Philadelphia communities. To uphold the positive momentum Philadelphia has with regards to solar energy implementation, dialogue about solar applicability must continue. This entails having discussions with residents and community leaders of Philadelphia. The co-creation of solutions in this manner will help to ensure that future solar programs and initiatives are in fact sustainable. For a future researcher, the next steps for solar development is to continue to investigate what latent needs exist in disenfranchised communities. This research project was just one way of doing so but ultimately the goal is to have ongoing conversations to create mutual understanding not only for the sake of solar development, but also for sustainable relationships that will uphold such technology.

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Voice, Visibility and Power: Contextualizing the Undergraduate Black Women Experience at a Predominately White Institution

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Symone A. McCollum, McNair Scholar, The Pennsylvania State University

McNair Faculty Research Adviser: Royel M. Johnson, Ph. D.
Assistant Professor of Higher Education
College of Education
The Pennsylvania State University

Abstract— This exploratory, phenomenological study is centered on the lived experiences of Black undergraduate women enrolled at a predominately White institution (PWI). This study sought to highlight intersectionality as a key role in one's understanding of their identity in these spaces. The findings of this study suggest three key roles in these experiences; the need to uplift the race, interactions with other Black women, and the importance of a physical space on campus. Implications for administration, faculty and researchers are discussed.

Keywords: Black women, predominately White institution, intersectionality

INTRODUCTION

Data provided by the National Center for Education Statistics (NCES) indicate that Black women earned 66% of associate degrees and 64% of bachelor's degrees during the 2013-14 academic year, outperforming other ethnic and gender groups (NCES, 2014). While this data suggests Black women are performing well academically, there is an undeniable relationship between race and gender as marginalized identities that lead to the lack of voice, visibility and power for Black women. Due to this, Black women experience college in marginalizing and oppressive ways that are different from their peers who do not share the same intersecting identities. From this, we know that Black women do not experience higher education in equitable ways and the intersections of race and gender and race create a unique set of experiences for Black women in different academic and social spaces. However, the stories of Black women in these spaces are rarely placed in academia.

The purpose of this exploratory, phenomenological study is to examine the lived experiences and intersecting identities of undergraduate African American women at a large, predominantly White institution (PWI). Drawing on intersectionality as a framework, the following research questions guide this study: (a) What is it like to be a Black woman at a PWI? and (b) In what ways does their multiple intersecting identities (e.g., race, gender, etc.) impact their academic and social experiences?

The goal of this research is to contextualize the marginalized experiences of African American women in predominately White social and academic spaces.

Review of Literature

To conduct this study, it is necessary to review of literature in the following two areas: (a) what we know about Black women's experiences getting into institutions of higher learning and (b) research on the experiences of undergraduate Black women in higher education.

Black Women's Journey to Higher Education

From the very founding of higher education, Black women have been excluded from achieving a higher education. Colleges and universities, originally created and designed for White males, were the earliest signs of Black women being excluded by their race. This trend was most evident when Harvard University was founded in 1636. During its founding, Harvard only allowed White males to enroll, which consequently set the tone for institutions of higher education to only support White populations of students and to discriminate against other populations solely on the color of their skin (Jones, 2006). And while women's liberation movements helped broaden access for women in higher education, this primarily included White women, excluding Black women. This provides yet another example of how Black women were excluded, but due to gender and race.

In an attempt to grant all social students' equal access to education, the Land Grant Act of 1862 created "separate but equal" Black colleges throughout the Southern states (Cross, 1991). There were an estimated 200 schools to serve Black students existed in the early 1880's but remained an attempt to keep higher education in the South segregated (Evans 2002; Porter 2013). Further, critical pieces of legislation such as *Brown vs. Board of Education* provided more opportunities for Black students to become enrolled at PWI's (Fleming, 1984). Consequently, the experiences for Black students relied on predominately White instructors who were often unable to understand or identify the needs of Black students in those spaces. Therefore, the experiences of Black undergraduate students at predominately White institutions remained marginalized at the expense of the institution.

Towards the end of the nineteenth century White women founded schools to train Black girls to become refined ladies to uplift their race. Because White women felt it was their duty to focus on the moral and educational development of Black women, early education for them sparked institutions known as "grooming schools" that would ironically develop some of the greatest Black women scholars in the world (Zamani, 2003). Moreover, because White women saw Black women as uplifters of their race, more attention was given to their development in that area. Both Blacks and Whites believed "… that black women bore the weight of the entire race. If they failed, a whole people failed" (Brazell, 1992). As a consequence, White missionaries oversaw every aspect of Black women's curriculum, dress, conduct and social interactions. Consequently, the Black woman's experience in higher education in its earliest stages faced limitations in roles and occupations. As a result, Black women's first earliest encounters in academia demonstrated a burden to uplift the Black race only be performing domestic duties and limited occupations to better themselves in fields they chose.

Experiences of Undergraduate Black Women

The marginalized and intersectional experiences of Black women at PWI's highlight the need to define and describe the specific needs of those students while enrolled. While research on this topic is relatively new, scholars have advanced research in two areas: (a) how Black women make meaning of their multiple layers of identity and (b) lack of visibility for Black women in these PWI spaces. Due to this study being relatively new, not much is articulated in academia to support these marginalized and oppressive experiences. However, scholars such as Christa J. Porter, Rachelle Winkle-wager, Constance M. Carroll and others have advanced scholarship in this area.

For instance, Carter, Pearson and Shavlik (1998) note that "historically black women have been one of the most isolated, underused and consequently demoralized segments of the academic community" (p. 98) demonstrating the lack of visibility for Black women in higher education. Unlike their White peers, Black women experience oppression at the intersection of their race and gender, which shapes their ideas, views, beliefs and life decisions.

In addition to facing invisibility, as stated by Carroll (1982), "the Black woman in higher education faces greater risks and problems now than in the past" because she is in a place previously occupied by the dominant group, and the numbers are growing on college campuses—she is becoming more "visible (Howard 2015)." As a consequence, the increase in diversity does not match the increase in policies and spaces of affirmation for Black women once they become more visible in these spaces. While this study tells readers that Black women are gaining more visibility, it also offers ways that faculty, staff and local cultural centers can play a critical role in assisting Black women during this process of self-exploration.

Similarly, bell hooks explores how Black women remain on the fringes of conversations surrounding Black people and women affirming recent studies on the marginalization of Black women in White spaces. hooks states, "No other group in America has had their identity socialized out of existence as have Black women. We are rarely recognized as a group separate and distinct from Black men, or a present part of the larger group 'women' in this culture…When Black people are talked about the focus tends to be on Black men; and when women are talked about the focus tends to be on White women (hooks, 1981)." Affirming this marginalization, Banks (2009) states "The way Black undergraduate women wear evidence of their membership in these socially constructed spaces, in connection with society's understanding of these spaces, is a root of the oppression Black women face and work to overcome." This diversity of experiences mimics a huge contributing factor to the lack of understanding of Black women's unique lived experiences in predominately White spaces.

Moreover, studies on Black women in higher education demonstrate how to how Black women in college conceptualize and make meaning of their identities Porter (2015). Porter's study suggests several factors such as personal foundations, precollegiate socializations, collegiate socialization, interactions with others, articulation of identity, influence of media and influence of role modeling according to data have a significant impact on how Black enrolled at a PWI develop and describe their identity as black women. Additionally, Porter points to PWI's as environments that foster opportunity for growth for African American women. She also emphasizes the need for spaces of affirmation, dialogue and connection for African American women in these spaces as an essential tool for educational and social success.

Additionally, Winkle-Wagner (2009) explores the narratives of 30 Black undergraduate women who make meaning of their identities through interactions with themselves, society and other people. These narratives focused on the struggle to define and maintain their intersectional identities in predominately White spaces. The shared feelings of isolation, culture shock and process of negotiating when interacting in different environments. Other important themes include being "too White" or "too Black" as well as being the only one of an intersectional identity within the academic space.

The unique experiences for Black women on predominately White campuses also rely heavily on fears overpowering their assertive sense of self when making meaning of their multiple layers of identity. Scholars such as Fleming explore how Black women experience being called upon to answer questions in academic spaces in which their identity as Black creates a tokenized piece of their existence (1984). Too often, Fleming describes, Black women are called to be the spokesperson for any Black social issues being presented in the space.

Conceptual Framework: Intersectionality

In the 1980's, the study of how different power structures interacted in the lives of Black women was coined "intersectionality" by Kimberlè Crenshaw. While Crenshaw coined the term intersectionality, the underlying concepts shaping this framework are not new. In fact, Patricia Hill Collins was one of the early examples that attempted to contextualize the overlapping identities Black women endure and their oppressive experiences due to their identities. In her book, "*Black Feminist Thought,*" the core tenants she introduced overlaps with what is now known as "intersectionality." Patricia Hill Collins argues four ideas that anchor Black women's' oppression; the legacy of struggle, interdependence of experience and consciousness, quest for self-definition, and the interdependence of thought and action (Jones & Wijeysinghe, 2011). Collin's view emphasizes the connection between how one thinks and what one does by privileging the self-defined standpoint of Black women. Additionally, Collins argues that Black women occupy unique standpoints on their own oppression composed of two components:

1. Black women's economic and political status provides them with a distinctive set of experiences that cultivate a different reality that is not experienced by other gender and racial groups in the same way.
2. These experiences create a unique Black feminist stream of thought concerning that reality which is not identical for all Black women (Collins, 1990).

Centered on both the lived experiences and academic work of Black women, intersectionality, in the scope of this research, assists in framing the interconnectedness of social categories such as gender, race and class as they overlap and create a unique set of barriers that generate discrimination and oppression (Crenshaw, 1991). The state of oppression, meaning systematically unjust conditions forced by one group onto another, constitutes a discussion on the role of its interaction with the Black woman identity.

Intersectionality is introduced as a theoretical framework that aims to provide a voice to social groups who occupy multiple layers of identity. In this research, intersectionality gives voices to the experiences of Black students in places where their voices were silenced. Moreover, intersectionality provides a more holistic view of identity especially in spaces of higher education. Winkle-Wager (2009) highlights, "scholarship often separates race and gender in ways that demonstrate privileged structures in society. Race studies may implicitly exclude racial minority women and studies of gender are framed as an issue of White women (2009). As mentioned earlier, Black undergraduate women embody multiple intersecting layers of identity and the intersection of these identities are framed by historical, social and political contexts that will be highlighted in the lived experiences through this research study.

Methodology

Design

This study was grounded in the exploratory transcendental tradition of phenomenology. A transcendental phenomenological approach attempts to understand lived human experience and consciousness when the preconceived ideas of a phenomena are actively removed. Scholars have identified the importance of phenomenology in higher education context (Heindel, 2014; Schuemann, 2014) and how it plays a role in how students understand and make meaning of their lived experiences. The purpose of this study was to examine the lived experiences and intersecting identities of undergraduate Black women at a large, predominantly White institution (PWI). Drawing on intersectionality as a framework, the research questions aim to identify factors that influence how Black women identify and make meaning of their intersectional identities in these spaces.

Data Collection

Data for this study was collected using individual semi-structured interviews in attempt to get participants to speak openly about their lived experiences going through this phenomenon. For participants, the criteria were the following: a) over the age of 18 b) currently enrolled at the Pennsylvania State University c) identify as woman and identify as Black. Due to this study being a preliminary study, one interview was conducted with each woman. In order to offer privacy and security for students who were not on campus during the time of the interview, interviews were conducted online using an audio media service. Participants and the research team were expected to find a secluded room with closeable doors to participate in the interview on their end via Zoom. The same expectation for the primary researcher was to find a secluded location to conduct the interview via Zoom. Interviews were up to 60 minutes in length. Some of the interview questions were the following: What does it mean to be a Black woman in college? Is there a physical space for you on campus; if so, how do you negotiate those spaces?; and How supported do you feel as a Black woman on campus?

Following the semi-structured interviews, phenomenology requires interviews to be transcribed. After interviews are transcribed, key themes need to be organized and coded to better define the phenomenon to share with others. The primary researcher for this study transcribed the interviews and found key three themes relating to the research question.

Research Site

The Pennsylvania State University-University Park campus is the research site for this study. According to Penn State's Fact Book, as of Fall 2017 there are 1,948 Black students enrolled at University Park out of the 46,610 students enrolled. As a consequence, Black students make up only 4.2 percent of student enrollment. From 2013 to 2016 the percentages of Black students were the following: 4.1, 3.8, 3.9 and 3.9 respectfully. While this data suggests that over the last year, more Black students enrolled at Penn State's University Park campus than previous years beginning in 2014, the enrollment of Black students has been under 4.2 percent in its history.

Moreover, data from the Fact Book suggests Black students graduate at smaller rates than other racial and ethnic groups besides Native Hawaiian/Pacific Islander students. The four-year graduation rate for Black students as of the 2012 cohort is 48.3 percent. For five-year graduation rates, the percentage of Black students who graduated from University Park in the 2011 cohort was 63.4 percent and the six-year graduation rates for the 2010 cohort was 70.2 percent.

The Fact Book does not separate women from men in each racial and ethnicity group.

Participants

Participants were undergraduate Black women currently enrolled at the Pennsylvania State University. In order to find participants, unorganized social media platforms were used to recruit those fitting the criteria of the study. These participants were located in a GroupMe filled with over 300 Black women currently enrolled in the institution in efforts to locate those who were able to better articulate their lived experiences once being introduced to other likeminded women. This unorganized group was formed by students in the fall of 2017 in efforts to create a space for Black women to know programs and events that were made for them by their peers. The rationale for including this criterion was to locate those who were better able to articulate their lived experiences during this phenomenon and who were actively experiencing the phenomenon.

Three participants were identified. The women ranged in ages from 19-21, from second year of enrollment to the third, and majors varied from STEM to the humanities. Only one of the participants was first generation, but all three came from urban inner cities across the United States. To keep their identities protected, pseudonyms were used. Below is a brief demographic of the participants:

Name	UG Institution	Major	First Generation
Ashley	Penn State	Sociology and African American Studies	Yes
Tia	Penn State	Psychology	No
Mariah	Penn State	Biology	No

Data analysis

Data was analyzed after interviews were thoroughly transcribed. Each transcribed interview was documented on three different word documents. The primary researcher began looking at all aspects of the experiences described by the participants. The primary researcher then began identifying commonalities and organizing key themes using coding methods. After commonalities were identified, a new document with key quotes under each theme was created.

Epochè

My own experience with this phenomenon lies in the intersections of my identity generating both positive and negative experiences in predominately White spaces. I have always been hyper vigilant in my identity as a Black woman. Whether it was in high school where I wore the faces of eight Black women wrongfully murdered at the hands of police on my graduation cap or at the beginning of my college career where I forcefully inserted my narrative into curriculum that erased my identity, I have always known who I was. Moreover, most of my learning took place on an individual level. I would buy books, utilize Google and other forms of media to gain more insight on why my identity was so crucial. The more I understood, the more I needed people to understand how fearless, beautiful and resilient my women were. As a consequence, when I arrived at Penn State I sought Black women who served as mentors and Black women who served as sisters. I joined organizations that catered to Black women and worked my way up to lead it in the direction I felt the campus needed. I also joined programs and other organizations that clearly erased my narrative, but I made it imperative to share my identity in any space it could fit.

However, my narrative was not always met with gratitude. I was often called "aggressive" by my White professors who scorned me for questioning their sexism, racism or blatant attempts to ignore the role of Black women outside of Black history month. There have been times where I have been frustrated and felt alone in this journey, but I would not break. There have been times where men would talk over me in meetings and women would talk about me behind my back. However, having mentors and supportive friends who could share my burden and bare my narration of the emotional labor saved my entire college experience. I knew that my intersections of race and gender would always push me away from being just "Black"

because that meant masculinity to most and being a "woman" where that meant White women only. Moreover, I am still finding ways to improve the climate for Black women on campus and making sure our voices are heard clearly and loudly in all spaces we occupy.

Findings

Three key themes were identified: need to uplift the race, interactions with other Black women and the importance of physical space to determining how Black women experience higher education. Moreover, while their experiences differed, these themes echoed throughout each participants stories of their experiences at Penn State. The questions aimed to directly address their interactional identities of being Black and a woman. As a consequence, all of the participants were able to articulate how being in a predominately White space affirmed or denounced their own understanding of being a Black woman. These experiences were faced individually by internalizing certain familial structures and other forms of methods to mold identity. All participants were aware of their phenomenon as Black women in White spaces and allowed themselves to open fully with their views on other Black women, the campus as a support system and other common themes.

Three Themes

The three participants shared three common themes that helped them articulate their identities in predominately White social and academic spaces. Their individual narratives painted persistence in the struggle to articulate identity as well as factors that affirm or challenge what they believed they knew about themselves. By providing a safe space, as done in this study, the participants began articulating their experiences in ways that was not otherwise granted to them. In this space, women expressed their gratitude for other women, the burden they feel as Black women and the blurry line between physical and emotional spaces on campus available to them.

Burden to Uplift the Race

"I've been blessed with the opportunity to go to college and I think that for Black women, especially in the United States, I think it's just an obligation to your community, an obligation to young Black girls who are looking up at you and seeing what you're doing."

The participants articulated the importance of attending a college or university as Black women, however, what was interesting to note was their ability to explain this importance in terms of uplifting the Black community without even knowing it. The general interpretation of attending college was the following: necessary for young Black girls and Black people in general, college is not often experienced by Black women and a hyper vigilant understanding that being Black and a woman in this space creates a unique burden to succeed. Furthermore, Ashley, a junior and first-generation student, stated "I've been blessed with the opportunity to go to college and I think that for Black women, especially in the United States, I think it's [going to college] just an obligation to your community, an obligation to young Black girls who are looking up at you and seeing what you're doing." This narrative illustrates the pressure for Black women to succeed in spaces of higher learning as they are socialized into thinking it is solely their responsibility to uplift and lead the race.

Moreover, this same narrative echoed in the other two participants. Mariah, a senior, explained, "Being a Black woman in college means that I have the opportunity to not only better myself for myself but as well as benefit the whole black community. I feel like as Black women, we have a lot of pressure upon us to succeed and to well." This urgency to excel and prove that limits can be surpassed seems a role Black woman were assigned in terms of their success. However, while the women identified each time that attending college benefited them, it was warranted to introduce whole communities such as the Black community that they needed to uphold.

This burden persisted in academic spaces as well. As Ashley notes, "I definitely feel tokenized in my, I won't even say not only my sociology classes, because a lot of times especially at Penn State, some of the [African American] classes are used as general education courses um and so you have a lot of White students in these classes and it ends up being two or three Black students and you may very well be the only Black girl in there and you're inherently tokenized and then you also have to watch our tone because you may get deemed as this angry or aggressive or too assertive or bossy." Often times in academic spaces these Black women felt that they carried the burden of the entire race in their classes. Whether they were the "only" Black individual or woman in the class, each participant echoed the pressure of getting things right in fear of disappointing the entire community within their classes.

The women articulated their feelings of carrying the burden to uplift the race without directly stating this narrative. This points to a socialization of Black women when articulating their identities. Whether through familial structures or media/literature, this role has been instilled in these women while they are experiencing their academic spaces.

Interactions with Other Black women

"I'm able to relate to people or talking about things that stress me out that I feel like is overwhelming for just me."

Each participant passionately explained how their interactions with other Black women were useful to their success at Penn State. The women echoed how having other Black women in a predominately White space provided them with outlets of people who truly understood their daily struggles and triumphs. Even if their relationships with Black women in their home cities were typically negative, it was something about Penn State's space that made them yearn for those relationships more than they would have if placed in other environments. Moreover, while all three Black women spoke highly of their experiences at Penn State with Black women, they also touched on how speaking to other Black women helped them form and articulate their identities. For example, Ashley, a junior, states, "For undergraduate women, I definitely have found, as soon as I came to Penn State, so many other Black women who were older than me to just talk to them about their experience and how they were able to navigate Penn State and I think I've grown so much from Ashley 2.0 to Ashley 3,000 sometimes because I just been able to just find mentorship." This dependency on other Black women to help hold them accountable as well as share their emotional labor echoed in those who felt like their college experience so far was successful.

On the other hand, for both Tia and Mariah who grew up in urban city areas, their expectations of interactions with Black women on campus were negative. Though this did not play a role in their actual experience, it was their expectation walking into college. They experienced negative relationships with Black women at home and expected that to carry into their college experience. However, both were shocked when they could proudly say their relationships with Black women on campus were positive for the most part and how beneficial it was having someone to relate to in different spaces.

For the participants who sought mentorship from not only undergraduate Black women but Black women who were faculty and staff, their experience with articulating their identity was greater. For example, Ashley who sought mentorship from Black women who were faculty and staff often discussed relating to the faculty who experienced the same emotional labor within their profession. By being able to relate to faculty on their experiences as an undergraduate student, Ashley was feed more information on how to truly engage in spaces that were not designed for her but still belonged to her.

On the other hand, this clashed with the experiences of the other two participants who did not seek mentorship from Black women who are faculty and staff. Tia states, "As far as mentorship, I personally am not close with any teachers or any faculty, especially African American. I don't know if it's because I just transferred last year or I just don't know anybody really." However, no attempts to meet with Black women who are faculty and staff or seek mentorship was mentioned by either participant.

The Importance of Physical Space

"I find that spaces like that happen but they're not made to the point where you can say this is permanent and this will be here for years and for decades for all black women whenever they come to Penn State, whenever they come to an undergraduate institution it becomes a two year thing and then people lose the momentum and then it usually loses funding—it just becomes a second thought."

All participants expressed their involvement in student organizations dedicated to the advancement of Black women, but when asked about a physical space, they could not provide a solid example. One of the participants stated, "Organizations just meeting up and just being able to have these organizations is the space. Physical space I'm not really sure if we have a physical space." Another echoed with, "Not a permanent space for Black women. Not a space where they can safely come and engage and talk and learn and understand because I think that it's hard to bring people from such different backgrounds and with people coming from different learning points and different parts in their journey. So, when they come together it's a lot of clashing and that spaces like that can't even happen because we're focused on something else or stuck on a smaller part of the bigger picture. And then I think that it's just not permanent."

Underneath their frustration lie a real missing space they felt did not do them enough justice on campus. While they could clearly articulate organizations that assisted in creating a temporary space, they could not find a space that currently existed that did enough to support them holistically.

This yearning for a change in the temporary status of support for Black women echoed in all three participants. Their genuine appreciation for the little times they experienced those spaces were evident, but a sense of disappointment overwhelmed their security with feeling there was a unique space granted for them consistently.

Discussion

This study identified three key themes in understanding how Black undergraduate women experience college. Porter's 2014 study suggest several factors such as personal foundations, precollegiate socializations, collegiate socialization, interactions with others, articulation of identity, influence of media and influence of role modeling according to data have a significant impact on how Black enrolled at a PWI develop and describe their identity as Black women. This research reaffirms interactions with Black women being essential to the college experiences of Black women. The participants expressed enthusiasm for building relationships with undergraduate Black women in these White spaces and saw it as essential for their development. They defined for themselves what kind of women they were seeking relationships with and in what spaces do they typically meet.

Moreover, Winkle-Wagner's 2009 study is reaffirmed in this research through the commonalities of isolation in both social and academic spaces. Although only one participant felt completely tokenized in some spaces on campus, all three echoed the importance of knowing their identities as Black women on campus. Contradicting some of their positive experiences, all participants knew and recognized that this institution was not designed to enroll students like themselves which creates a new set of barriers leading to isolation on campus. Moreover, this research extends how other factors in each participant changed the way they experienced isolation. For the one participant who was heavily involved in Black student organizations and African American studies as her major, her contextualization of her tokenized experience was from a completely different level of identity development. Similar to scholars such as Fleming explore how Black women experience being called upon to answer questions in academic spaces in which their identity as Black creates a tokenized piece of their existence (1984). This study reaffirmed this notion presented by Fleming through one participant.

The importance of intersectionality as a lens to guide this research is critical in making strides towards understanding Black women's identity holistically. This study reaffirmed the notion that Black women are left out of spaces that are deemed "Black" when referring to only Black men and "women" when referring to only White women. All the participants did not separate their identities but instead streamed them together in efforts to self-define and recognize themselves in White spaces. The environmental factors that a predominately White institution create experiences of oppression when met with a multitude of intersectional identities.

Implications

Although the number of participants for this study was significantly small, the women who participated were able to clearly articulate their experiences in predominately White social and academic spaces. This data serves as an attempt to expand the literature on Black women's contextualized experiences in these spaces and to highlight what communities who wish to engage with this population of students need to know to holistically support them. This study formed three experiences with articulating intersectional identities.

Implications of this study begins with better constructing research on how Black women contextualize their own experiences. Due to one of the key themes being "burden to uplift the race," it can be noted that these participants have outside influences that help them articulate their perceptions of their identity. Not only does more research needs to be published to truly highlight the experiences of Black women in college, but literature addressing Black women articulating their identity in White academic spaces is crucial. In these pieces of literature, women need to be able to become fully supported in media in their roles as students receiving an education not women who bear the burden of receiving an education for the entire Black community.

Secondly, I encourage the Pennsylvania State University to increase enrollment of Black undergraduate women. Highlighted in this study is the importance of interactions with other Black women in predominately White spaces. The participants all self-identified this interaction as their key to success in this type of college environment. If Penn State increases its enrollment of Black women, these critical relationships will be sustained for years to come for those who seek them. Additionally, with an increase of enrollment in undergraduate Black women, an increase in Black women who serve as faculty and staff should soon follow. With more Black women visible on campus, those who seek mentorship and friendship with Black women will be holistically supported and can pinpoint the school's real strides towards inclusion.

Lastly, the physical spaces that currently exists on Penn State's campus have been identified as insufficient by these participants. While all of the women agreed that organizational programming provides a temporary comfort on campus, there are no physical spaces that provide the protection they need as both Black and women. If spaces on campus that already exists aim to provide safe spaces for Black women revisit things such as programming and the climate of their space to ensure they are serving who is intended in these spaces. Additionally, making sure the input of Black women on the condition of the space is valued. Seeking surveys from students on how well the space is useful in supporting Black women is key.

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The Effect of Neural Activity on Brain Temperature

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Sarea Recalde-Phillips, McNair Scholar, The Pennsylvania State University

McNair Faculty Research Adviser: Patrick J. Drew, Ph.D.
Huck Distinguished Associate Professor of Neural Engineering and Neurosurgery
Departments of Engineering Science and Mechanics, Neurosurgery,
and Biomedical Engineering
College of Engineering
The Pennsylvania State University

Abstract

The brain is a temperature-sensitive organ that needs to be within a narrow temperature range to function properly. The regulation of proper regulation of brain temperature is essential, but the mechanisms controlling brain temperature are not well understood. Cerebral blood flow (CBF) has been hypothesized to help in regulating local temperature by carrying heat away from an area. Neural activity generates heat and increases in CBF are coupled with neural activity. In this study, we aim to investigate the effect of independently manipulating CBF and neural activity on local brain temperature.

Brain temperature in awake mice will be measured with a K-type thermocouple implanted in the cortex. We can decrease neural activity and blood flow using local infusions of the GABA-A agonist muscimol or decrease blood flow without changing neural activity with the nitric oxide synthase inhibitor L-NAME. We will compare any temperature changes evoked by drug infusions to a vehicle control.

We expect this study to demonstrate one of two possibilities: either changing neural activity without changing blood flow alters brain temperature or the temperature changes caused by changes in neural activity are small. These experiments will help determine the role of blood flow in regulating brain temperature.

Introduction

The brain is a prominent organ that enables bodily function, and maintenance of its temperature is essential. Extreme deviation from a normal, baseline temperature leaves the brain vulnerable to incapacitation in the form of physiological deformation, increased susceptibility to toxins and toxicity, and death (Trübel et al., 2005; Wang et al., 2014). Brain temperature has been documented to fluctuate in response to environmental, physical, and behavioral stimuli (Aronov et al, 2012; Delgado et al., 1966; O'Herron et al., 2016).

However, despite the type of stimuli, multiple physiological mechanisms aid in maintaining a baseline temperature necessary for optimal brain function. Cerebral blood flow, for example, helps to carry away excess heat generated from metabolic activity occurring throughout the brain (Trübel et al. 2005). The shielding effect further stabilizes interior areas of the brain from drastic temperature changes (Zhu et al., 2006), while surface temperatures of the brain are more prone to higher degrees of temperature fluctuation (Kiyatkin et al., 2010)

Neural activity contributes to a significant amount of the heat generated in the brain, and thus contributes to fluctuations in regional brain temperature. Existing physiological mechanisms

like cerebral blood flow have been observed to couple with neural activity (Yablonskiy et al., 2001), but few studies have investigated how regional brain temperature is affected with neural activity and blood flow are independently modulated from one another.

Drugs such as muscimol (which hyperpolarizes all neurons) and L-NAME (which will block the synthesis of the vasodilator nitric oxide) have been used as tools in investigating brain-modulated behavioral changes. Muscimol is a GABA-A agonist that temporarily decreases metabolic processes in the injected site (Majchrzak and Di Scala, 2000). Both neural activity and blood flow are downregulated in response to muscimol, and the effects of the agonist are reversible in experimental models. L-NAME acts in a similar way to muscimol; rather than affecting neural activity, L-NAME will cause vasoconstriction of the blood vessels in the injection site by inhibiting nitric oxide synthase (NOS) activity. This agonist targets nitric oxide synthase (nNOS), an enzyme responsible for inducing vasodilation, and decreases its production, which in turn decreases blood flow through via vasoconstriction. Utilizing muscimol and L-NAME as tools to modulate neural activity and blood flow, we aim to investigate and understand how independent modulation of either factor affects brain temperature.

Methods

Construction and circuit design

Thermocouples were designed for prolonged use and long-term cranial implantation. K-type thermocouples (5TC-TT-K-40-36; Omega Engineering), and wire ends were fused together using colloidal silver. Polyimide tubing insulated exposed areas of the thermocouple wire, adding to more accuracy of thermal measurements.

Constructed, and subsequently implanted, thermocouples were connected to an amplifier. The amplifier's circuit design was adapted from Aronov et al. (2012) and subsequently attached to a power supply unit, the thermocouple, and a data acquisition system (LabView). Wires soldered to the cold junction compensator (LT1025 Linear Technology) and operational amplifier (LTC1050 Linear Technology) were coated and insulated with epoxy.

Animals

CBL567 mice (Jackson Laboratory) were used for experiments and data acquisition. Housing, specimen handling, and later described procedures followed the guidelines specified by the Institutional Animal Care and Use Committee (IACUC) of Penn State. Mice were housed individually in cages for the duration of the period of experiments and housed in an area that underwent 12-hour light/dark cycles. Mice were fed and watered ad libitum.

Surgical implantation

Male mice (n = 4) were between 3-8 months of age throughout the duration of experiments and weighed prior to surgery (26.9 ± 2.5). Anaesthetization included the use of isoflurane. Mice scalps were resected, and a thermocouple and custom-made titanium metal bar was implanted. Control mice (n = 2) were not implanted with a cannula. Cyanoacrylate glue (Vibra-Tite, 32402) was used to fix the metal bar to the skull along the midline and posterior to the lambda cranial suture. The skull was stabilized via self-tapping screws (#000,3/32", JI-Morris, Southbridge, MA) that were placed into the contralateral parietal and ipsilateral frontal bone. Thermocouples were implanted at a 30° angle and depth of 700μm near the FL/HL representation of the somatosensory cortex. Mice implanted with a cannula along with the thermocouple (n = 2) had the cannula placed in the FL/HL representation of the somatosensory cortex. Metal bars were implanted and used to fix a mouse's head as it ran on a stationary ball. All implanted devices and exposed areas of the head were covered using black dental acrylic.

After surgery, mice were housed in separate cages in the housing unit and allowed to recover between 2 and 3 days prior to habituation. Weight was documented daily for 8 days and subsequently documented on a weekly basis for the duration of the period of experiments.

Habituation

Mice were habituated to the environment of future experiments. The implanted headbars were used to fix a mouse's position on a stationary ball. Throughout a 3-day period, a mouse was head-fixed to the stationary ball for a duration of 15 minutes, 1 hour, and 2 hours, respectively. Mice were enclosed in a near-room temperature (23.12 ± 0.025°C) rig that limited light exposure and visual stimuli from the external environment. Habituation occurred between 1:00pm and 5:00pm.

Data acquisition

Mice were head-fixed to the stationary ball for the duration of each experimental trial. Trials lasted 3 hours, and velocity recordings were low-pass filtered at 1Hz (Butterworth). Velocity was then binarized to describe events as either "running" or "not running." Temperature data was also low-pass filtered at 1Hz (Butterworth).

Mice implanted with only a thermocouple were injected with a diluted dimethyl sulfoxide (DMSO)-water solution and diluted clozapine n-oxide (CNO)-water solution. A mouse was injected with 0.05mL of either chemical solution and allowed 48 hours to recover before another injection of the other chemical solution was performed. Injections were performed an average of 30 minutes after the start of the experimental trial.

Cannula-implanted mice were infused with 0.5μL of muscimol at a rate of 0.025μL/min via a Hamilton syringe. L-NAME and muscimol infusions lasted an average of 20 minutes, and infusion setup was initiated an average of 1 hour after the start of each experimental trial.

Experiments were conducted in a rig that limited the amount of light and visual stimuli to the mouse during data acquisition. Experiments were conducted between 1:00pm and 5:00pm.

Histology

Mice were anesthetized and perfused initially with heparinized saline and then 4% paraformaldehyde (PFA). Implanted devices such as the metal bar, screws, thermocouple, and cannula were removed prior to immersing the mouse head in 4% PFA. The head was allowed to saturate in the PFA solution for at least 24 hours before brain extraction and subsequent immersion in 4% PFA with 30% sucrose. The brain was removed from the solution after 24 hours and sagittally sectioned for Nissl staining. Each section was on average 90µm in thickness and was used to verify the location and depth of thermocouple implantation.

Statistical analysis

Paired two-tail *t*-tests were performed injection trials (n = 3) of either DMSO or CNO underwent. This test was performed for each both mice injected with DMSO and CNO. Two-way ANOVA was utilized to compare average brain temperature among pre- and post-DMSO and CNO injections. Statistical tests and analyses were performed in Matlab (Mathworks).

Results

Comparison of temperature change caused by CNO and DMSO injection. Mice (n = 2) implanted with only a thermocouple were subjected to CNO and DMSO injections in order to determine if either chemical solution affected brain temperature. Brain temperature prior to CNO or DMSO injection averaged $37.6 \pm 0.012°C$ and $37.7 \pm 0.054°C$, respectively. Brain temperature was slightly higher prior to DMSO injection, but both average temperatures had high standard deviation values. After injection of either CNO or DMSO, brain temperature averaged to $37.2 \pm 0.107°C$ and $37.1 \pm 0.228°C$, respectively. Deviations were high due to the average temperatures of the experimented mice, both before CNO injection (S4: $36.9 \pm 0.380°C$ *vs* S11: $38.2 \pm 0.333°C$) or DMSO injection (S4: $36.8 \pm 0.654°C$ *vs* S11: $38.7 \pm 0.198°C$), and after CNO injection (S4: 36.5 ± 0.329 *vs* S11: $37.8 \pm 0.367°C$) and DMSO injection (S4: 36.4 ± 0.458 *vs* S11: $37.9 \pm 0.292°C$).
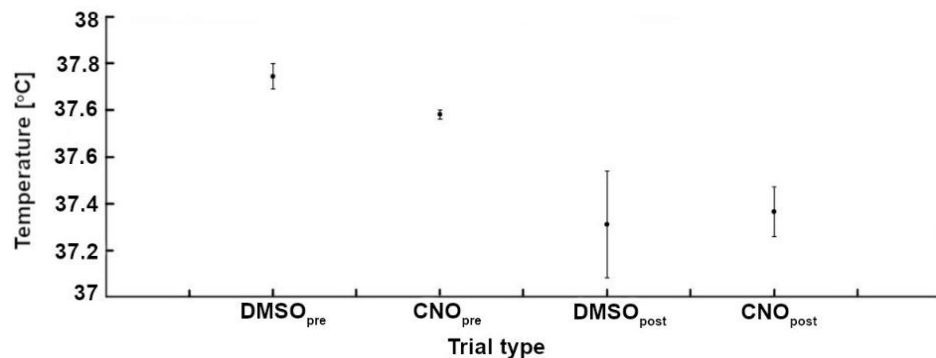

Figure 1. Average temperature pre- and post-DMSO and CNO injections. Pre-injection temperature of both CNO and DMSO were higher than their post-injection counterparts.c Individual pre- and post CNO injections of the mice in the experimental group did not significantly vary (S4: p = 0.208 *vs*. S11: 0.220). Temperature change in pre- and post-DMSO injection did not significantly vary in one mouse (S4: p = 0.143) while the other demonstrated significance in pre-/post-DMSO injections (S11: p = 0.005).

Experimental trials were conducted where both mice were not subjected to injection of either chemical solution. This control served as a control for both injections and served as the baseline when comparing how much brain temperature changed in response to DMSO or CNO injection, as shown in Figure 2. Prior to CNO injection, average temperature change among both mice were within 0.5°C (S4: $0.021 \pm 0.051°C$ *vs* S11: -0.179 ± 0.062oC.After injection of CNO, brain temperature remained lower than the

baseline as it had been prior to injection. Temperature change did not become higher than the baseline for CNO injection until more than 60 minutes had passed after injection. Temperature change of CNO injection decreased below the baseline, but eventually increased to above the baseline near the end of the trial. Overall, brain temperature change stayed within 0.25°C of the baseline pre- and post-CNO injection.
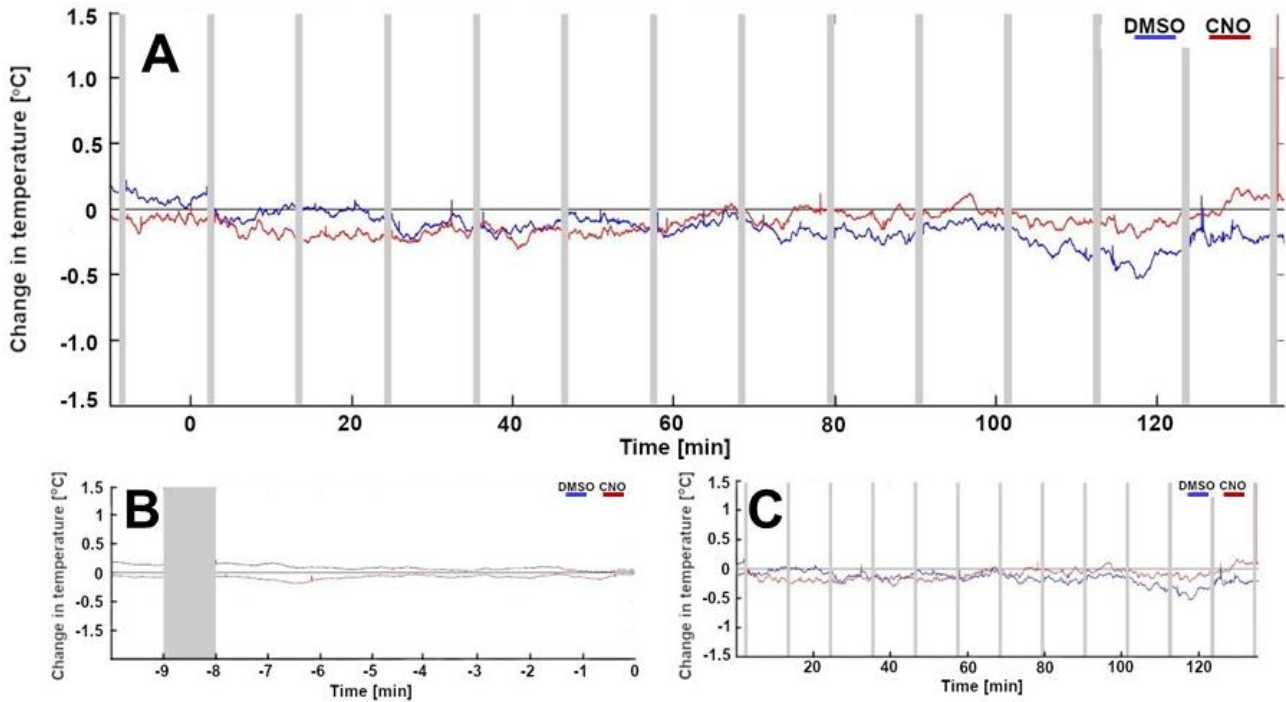

Figure 2. Temperature change in response to CNO or DMSO injection. Time of injection was designated as t = 0. Data was acquired in 10-minute intervals with 1-minute intervals in between each 10-minute bin.

Temperature change remained within 0.250°C (S4: 0.250 ± 0.046°C *vs* S11: 0.246 ± 0.090°C) above baseline temperature prior to DMSO injection. DMSO injection did not demonstrate an immediate effect in how much brain temperature changed relative to the baseline. Temperature change averaged within 0.250°C above or below (S4: 0.216 ± 0.115°C *vs* S11: -0.206 ± 0.209°C) the baseline post-DMSO injection. A slight decrease in temperature was demonstrated around 70 minutes after DMSO injection, but temperature increased toward the baseline near the end of the trial. Bouts where the average brain temperature difference between DMSO and the baseline was negative and positive fluctuated throughout the trial, but for a majority of the time temperature change was below the baseline for the DMSO injection trial. Brain temperature for most of the trial did not deviate outside of 0.5°C of the baseline.

Comparison of temperature change caused by aCSF, L-NAME, and muscimol infusion. Cannula-implanted mice (n = 2) underwent 3-hour experimental trials, as seen in Figure 2A. The cannula failed for one of the implanted mice, so data in Figure 2 represents the results of aCSF, L-NAME, and muscimol of one mouse. Separate infusions of aCSF, muscimol, and L-NAME were performed in 48-hour intervals. The average brain temperature before aCSF, L-NAME, or muscimol infusion was 37.0 ± 0.435°C. Figure 2B demonstrates that brain temperature remained steady during the pre-infusion portion of each experimental trial. Average pre-infused brain temperature of aCSF-infused mice was 37.1 ± 0.156°C. Pre-infusion temperature of L-NAMED-

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infused and muscimol-infused mice was 36.6 ± 0.111°C and 37.4 ± 0.140°C, respectively. Post-infusion temperature was lower than pre-infusion, as brain temperature averaged 36.4 ± 0.268°C when including all three infusion types (Figure 2C). Post-infusion brain temperature of the mice infused with L-NAME averaged a temperature of 36.1 ± 0.114°C. Mice infused with muscimol demonstrated an average brain temperature of 36.4 ± 0.210°C post-infusion. Both L-NAME and muscimol infusions resulted in a slight decrease in brain temperature when compared to the aCSF infusion. aCSF served as a control for the other infusions performed on the cannula-implanted mice, and brain temperature remained the least changed with the aCSF infusion (pre: 37.1 ± 0.156°C *vs* post: 36.6 ± 0.123°C) when compared to L-NAME and muscimol.
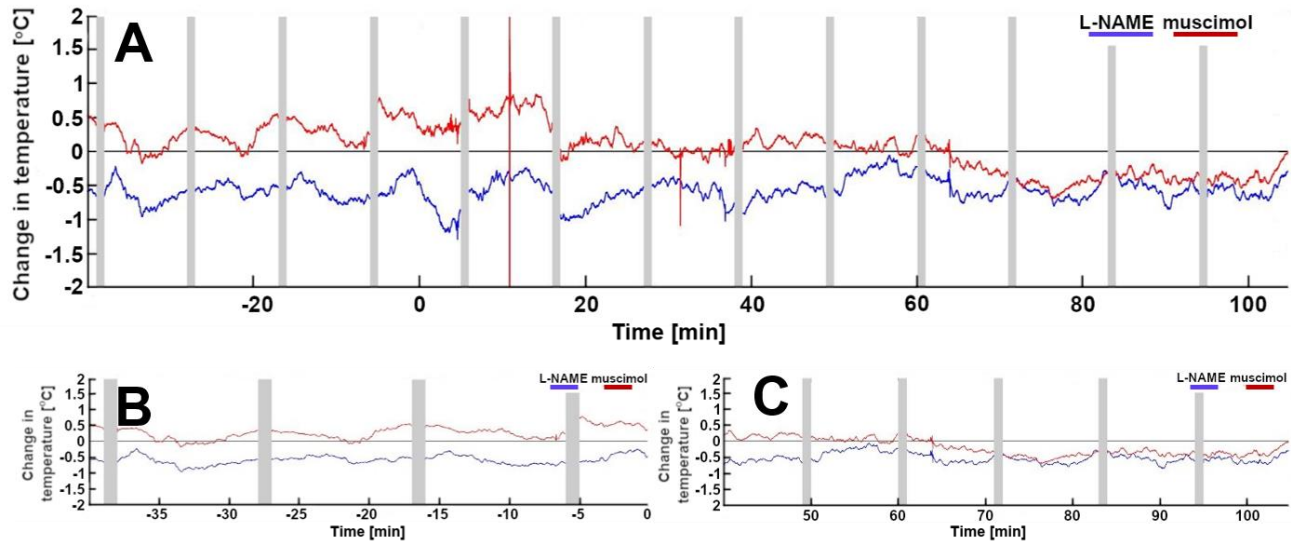

Figure 3. A: Infusion trials lasted 3 hours, and infusion setup started 60 minutes after the start of each trial. Data analysis accounted for 40 minutes prior to infusion setup and 40 minutes after infusion setup. The first and last 20 minutes of each experimental trials were not used in analysis. Infusions lasted an average of 20 minutes. t = 0 min indicates the time at which infusion setup started. B: Change in temperature between L-NAME and muscimol during the pre-infusion period remained within 1°C of aCSF trials, the latter substance serving as the baseline for comparison. C: After infusion completion and onset of L-NAME and muscimol, brain temperature exhibited a decrease in temperature when compared to aCSF infusion. Brain temperature of both L-NAME and muscimol were within 1°C less than the baseline (aCSF). Both infusions did not demonstrate a plateau in the rate of temperature decrease by the end of their respective experimental trial.

Discussion

DMSO and CNO injections provided no substantial change to brain temperature. The effect of DMSO and CNO injections was measured and compared to a running-only trial. With respect to the running trial as a baseline, brain temperature after either injection type did not demonstrate significant temperature deviation. This is supported by the functions of both drugs as described in previous studies; DMSO is a substance typically used as a vehicle control to other substances utilized in experiments. Its properties that attribute it to being used as a control supports the data acquired in the DMSO-CNO injections.

Similar to DMSO injections, CNO injections did not contribute to a drastic change in brain temperature. Pre- and post-CNO injections were within half a degree of change with respect to the baseline. The effect of CNO injection is to be expected because CNO is typically utilized congruently with designer receptors exclusively activated by designer drugs (DREADDs) (Manvich et al., 2018). No mice used throughout DMSO-CNO experiments contained DREADDs, so it is expected that the effects of CNO were not to be demonstrated in these experiments. Therefore, brain temperature was to not be drastically altered due to CNO injections.

Temperature changes were more likely influenced by frequency and duration of locomotion events than DMSO and CNO injections. Locomotion has been found to slightly increase cortical temperatures by 0.1°C when short bouts of locomotion is performed (Shirey et al., 2015). However, continues periods of running have been demonstrated to contribute to larger increases in temperature as well as the rate in which this temperature increase occurs (Kunstetter et al., 2014). Pre-injection data contains the most prolonged periods of locomotive events, and in turn brain temperature in this experimental period was the highest. A constant pattern in which locomotion decreased as experiments, regardless of it being a CNO-DMSO injection or aCSF-L-NAME-muscimol infusion, progressed was prevalent. Decreases in temperature were apparent as well.

Brain temperature decreased slightly following muscimol and L-NAME infusions. Brain temperature decreased following infusions of muscimol and L-NAME. The degree of this change was not distinct between either drug, but it should be noted that a decrease in temperature was exhibited when blood flow, neural activity, or a both factors were manipulated.

<center>Conclusions</center>

Brain temperature is affected and regulated by multiple factors that happen internally and externally from the body. Current research has hypothesized a coupling relationship between neural activity and blood flow. In this study, we aimed to investigate whether independent modulation of either neural activity or blood flow affected brain temperature. We found agonists L-NAME and muscimol slightly decreased brain temperature upon infusion. Although the change was not drastic, modulation of neural activity and blood flow suggests the role both factors have in brain temperature. Our findings need to contain more muscimol, aCSF, and L-NAME infusion trials and a larger pool of animal subjects to validate and support our findings.

Future studies will utilize DREADDs to further modulate neural activity while not affecting blood flow. To conduct further studies using DREADDs, we investigated whether CNO, an activator for DREADDs, affected brain temperature. In this study, we compared how much temperature changed with respect to DMSO or CNO injections. We found that temperature change values were similar between the two substances, suggesting that CNO does not provide substantial change in brain temperature after injection. This allows us to utilize DREADDs as a tool for expanding this research in the field. DREADDs-containing mice will provide more insight in the effect of upregulating or downregulating neural activity while maintaining blood flow.

Understanding how brain temperature changes with respect to neural activity and blood flow is essential in a clinical setting. Further understanding is needed in what factors contribute to hypothermic and hyperthermic conditions that may lead to irreparable damage and decreased functionality of the brain.

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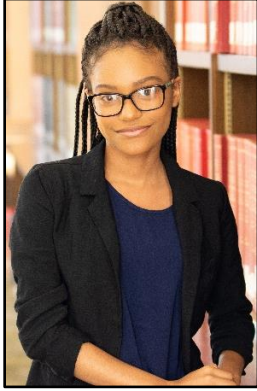
Understanding Hendra Virus Spillover from Pteropus Using Satellite Imagery of Critical Habitat

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Teairah M. Taylor, McNair Scholar, The Pennsylvania State University

McNair Faculty Research Adviser: Nita Bharti, Ph.D.
Assistant Professor of Biology
Center for Infectious Disease Dynamics
Eberly College of Science
The Pennsylvania State University

Abstract

Hendra virus (HeV) is an emerging infectious disease that is endemic on the continent of Australia. The virus naturally and asymptomatically exists in Australian fruit bats (*Pteropus*) and causes severe or even fatal disease in horses and humans. Geographic overlap between these bats and horses leads to spillover of HeV. The frequency of contact is likely correlated with the decline in the abundance of Eucalypt trees, the bats' primary winter food source, which forces the bats to forage in more urbanized areas. This study explores the changes in Eucalypt population over space and time as a driver in HeV spillover. We use high-resolution satellite imagery to identify species that comprise critical foraging habitat. These findings can facilitate the targeted preservation of critical foraging habitat for *Pteropus* as a means of disease management.

Introduction

Changes in land use have had a historical impact on the emergence of novel infectious diseases to the human population. The rapid clearing of vegetation on the continent contributes significantly to Australia's ecology. In recent years, there has been a common cause-effect relationship between deforestation and zoonotic spillover events by bats. The University of New South Wales Newsroom reports that, "More than 20 million trees are cleared every year in Queensland alone." (1) We hypothesize that deforestation, specifically of Eucalyptus trees, is an underlying cause of Hendra virus (HeV) spillover in Australia. Deforestation in Australia was largely focused on the agriculturally suitable soil of the continent's eastern coast; primarily in Queensland (Qld), New South Wales (NSW), and Victoria (2). Currently, Hendra virus is a significant public health concern in Qld and NSW.

Despite the increasing concern regarding Hendra virus in Australia, the environmental dynamics of the epidemiological triangle (host, pathogen, and environment) for Hendra virus are not fully understood. A zoonotic spillover event occurs when the reservoir host, which is the species that naturally carries the pathogen, successfully transmits the pathogen to a susceptible individual of another species. A pathogen will be successfully transmitted if the alignment of factors between the host, pathogen, and environment permit the necessary conditions for the pathogen to transmit and persist (3).

Gaining a better understanding of these relationships, particularly the environmental factors, is critical to current efforts to manage emerging infectious disease.

Hendra virus first spilled over in 1994 in Australia and is currently endemic in fruit bats on the continent, predominantly along the eastern coast. Hendra virus is a single-stranded RNA virus belonging to the Henipavirus genus, which naturally exists in Australian fruit bats of the genus *Pteropus* (4). Viruses from bats have been the causative agent in multiple spillovers and infectious disease outbreaks including SARS, Marburg virus, Nipah virus, Ebola virus, and Hendra virus (4). Such viruses have been found to naturally and asymptomatically exist within bats, the reservoir host, but can cause severe or fatal disease in humans and other species.

Spillover of Hendra virus from Australian fruit bats to humans follows a pattern of transmission. The virus is first shed by the bats in feces, urine, or saliva and can then infect a susceptible horse, which serves as an intermediate host, or bridge species, amplifying the virus and facilitating further transmission to other susceptible horses, humans, and other species. Hendra virus cannot be directly transmitted from bats to humans. As the geographic overlap between bats and horses increases, the occurrence of a spillover event becomes more probable. While bats forage near horses, feeding on foods of lower nutritional quality, the virus is more likely to be transmitted.

The current hypothesis is that Hendra virus spillover events occur as a direct result of nutritional stress in *Pteropus* (1). Australian fruit bats rely on nectar from flowering eucalypt trees as a primary winter food source. Changes in human land use and deforestation have led to a decline in the eucalypt tree population and eucalypt tree species flower unreliably (1). Furthermore, changes in human land use and deforestation have led to a decline in the Eucalypt tree population. In response, *Pteropus* bats have been driven to relocate to more urbanized areas where food is more readily available but of lower nutritional quality (2). Resultantly, the bats become nutritionally stressed and may potentially excrete larger amounts of virus, which increases the probability of spillover occurrence. Recent studies have aimed to quantify the effect of environmental factors that impact Eucalypt phenology on bat migration patterns and spillover occurrence with reasonable but limited success (1). Further research is crucial to developing a deeper understanding of Hendra virus and reducing its impact on global health.

We use satellite imagery to identify areas of critical foraging habitat for Australian fruit bats. This study aims to identify Eucalypt tree species based on their unique spectral signature at high resolution and in mixed vegetation forests. In prior studies, satellite imagery aided in performing retrospective analyses of human population fluxes (3) and changes in vegetation (4) with high levels of accuracy. We compared the satellite imagery to ground-truthed data collected in Australia, to create models that accurately identify the location of eucalypt trees. These findings help to prioritize areas for conservation and/or restoration of critical foraging habitat for Australian fruit bats in future management efforts of Hendra virus.

Materials & Methods

<u>Study Region</u>

We used vegetation maps created by the Australian Government: Department of Environment and Energy's "National Vegetation Information System" (NVIS) GIS file (5) to identify eucalypt populations along the eastern coast of Australia. The map provided a rough estimate of areas of land in Australia that were covered by eucalypt tree species. Our study area was confined to areas within the Australian states of Queensland (Qld) and New South Wales (NSW) because both states contain sites of HeV spillover. Our study area was further narrowed into areas of interest (AOIs) based on the following criteria: a protected land area where eucalypt trees are known to exist (Site A: Pelion Forest Reserve, Qld), an area where eucalypt trees and flying fox species have been studied prior to the first HeV spillover event in 1994 (Site B: Bateman's Bay, NSW), and where the human and bat populations are highly likely to overlap due to recent human population growth (Site C: Gold Coast, Qld).
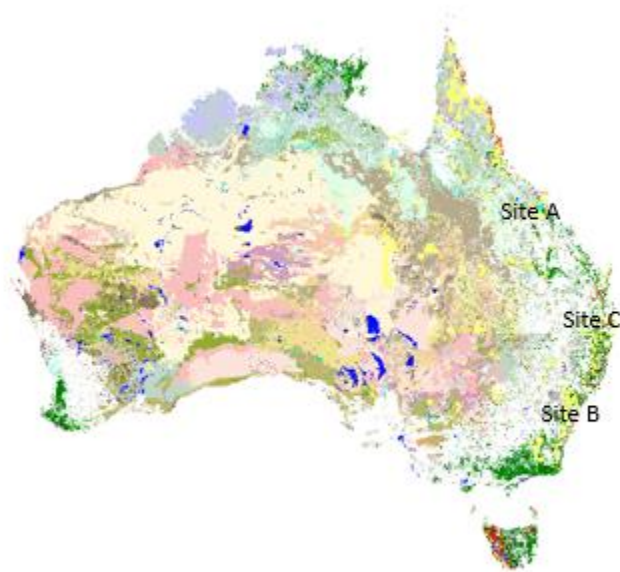

Figure 1: Overlaid vegetation map & protected land maps as viewed in ArcGIS. Selected study sites shown. Areas of forest primarily made of eucalypt tree species are depicted in dark green.

Selection of Site A considered land areas that are protected by the law as nature reserves or forest reserves. We overlaid the vegetation map and protected land map to identify this site (Figure 1). Such reserves are significant to our study as they are areas of land that are not disturbed by the surrounding human population. Nature and forest reserves allow us to assess changes in the eucalypt population mainly due to environmental effects. We identified the nature and forest reserves significant to the study area using the "2016 Collaborative Australian Protected Areas Database" (CAPAD) GIS file provided by the same government source (5).

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Ground-truthed data for Site B provided information on the locations and blooming events of eucalypt trees within the area in 2012 (Figure 1). However, our satellite imagery for this study was from 2016 – 2018. Further analysis of our satellite imagery will be done to verify our results using more recent ground-truthed data. This information was used to test the accuracy of satellite imagery in detecting eucalypt trees. Site C was selected due to the current increases in the human population and deforestation within the area (Figure 1). This site allows us to assess changes in eucalypt tree abundance as a direct effect of human pressure for land.

Vegetation Analysis

We utilized ESRI's ArcGIS ArcMap (6) mapping program to analyze vegetation maps of the study's geographic area using the 2018 Vegetation map (5). The maps show the locations of various vegetation groups across the continent. We calculated the areas of land covered by eucalypt trees in Australia using ArcMap. This provided an estimate for how much land-cover we would expect to observe in the satellite imagery of our study sites. Land-cover for all assessed vegetation outside of protected land areas were considered as results of environmental conditions, deforestation, and other human-related factors. We assessed available ground-truthed data in the study sites which provided accurate accounts of changes in the Eucalypt population over time. We also calculated the total area of protected land in Qld and NSW from the 2016 CAPAD map (5) using ArcMap.

Imagery Selection

Bounding boxes allowed us to gather imagery of an exact land area based on the decimal degree location of the corners of the bounding box. Table 1 provides the upper left (UL) and lower right (LR) boundaries for all study sites. For each study site, we acquired satellite imagery for the years 2016, 2017, and 2018. The selection of the satellite imagery took multiple factors into account. We only selected images that covered 100% of the area within our bounding box. We also only selected imagery that had minimal, if any, cloud cover. Additionally, the imagery used in the study was 4-band multispectral imagery which allowed us to use mathematical algorithms on the reflectance of red light, blue light, green light, and near infrared light. Satellite imagery used for this study (Table 2) was acquired from the satellite company *Planet*, which provides multispectral (4 band) satellite imagery captured at 3-5m resolution (7). When necessary, we selected multiple images for a specific day to ensure 100% coverage of the area within our bounding boxes.

Table 1: Bounding boxes within study sites

Study Site	Upper Left Boundary	Lower Right Boundary
Site A: Pelion Forest Reserve, Qld	21.02°S, 148.62°E	21.09°S, 148.70°E
Site B: Bateman's Bay, NSW	35.67°S, 150.17°E	35.77°S, 150.22°E
Site C: Gold Coast, Qld	27.95°S, 153.24°E	28.13°S, 153.43°E

Table 2: Detailed description of the satellite imagery used in this study. All images used for the specified site and year were captured by the same sensor. Image details are listed in Coordinated Universal Time (UTC)

Year of Imagery	Site A	Site B	Site C
2016	July 23, 2016 22:42 UTC	August 25, 2016 23:10 UTC	July 19, 2016 23:02 UTC
2017	July 21, 2017 23:31 UTC	May 15, 2017 23:12 UTC	June 7, 2017 23:11 UTC
2018	July 5, 2018 23:45 UTC	May 8, 2018 23:27:49 UTC	July 16, 2018 23:19:03 UTC

Satellite-Based Analysis

Analysis of all satellite imagery was performed using ArcGIS. We calculated approximate chlorophyll levels for the vegetation within the study region using Normalized Difference Vegetation Index (NDVI). NDVI uses red light and near infrared light reflectance as a proxy for chlorophyll to measure vegetation growth and health using the formula $(R_{NIR}-R_{Red})/(R_{NIR}+R_{Red})$. This measurement assigns a number to the amount of "greenness" observed in the imagery on a scale of -1.0 to 1.0. The scale allows us to more clearly distinguish vegetation from other types of land cover captured in the image such as road, bodies of water, and man-made structures. We then used the Eucalypt Chlorophyll a Reflectance Ratio (ECARR) and Eucalypt Chlorophyll b Reflectance Ratio (ECBRR) to distinguish eucalypt trees from other vegetation species (8). We calculated the ECARR and ECBRR using the formulas developed by Datt, $ECARR=0.0161[R_{672}/(R_{5503}xR_{708})]^{0.7784}$ and $ECBRR=0.0337[R_{672}/R_{550}]^{1.8695}$ (8). These algorithms recognize the unique spectral signature of eucalypt trees based on their reflectance peaks at green and near infrared light for chlorophyll a and chlorophyll b. Applying these algorithms to multispectral satellite imagery distinguishes probable locations of eucalypt trees from other vegetation.

Results

The Australian mainland has a total land area of 765.9 million hectare (ha) (9). The 2018 vegetation map revealed that of this total land area, approximately 654.4 million ha is covered by vegetation. In 2018, approximately 196.28 million ha of Australian land was covered by eucalypt trees (5) accounting for 25.6% of the continent's vegetative landcover (Figure 2).
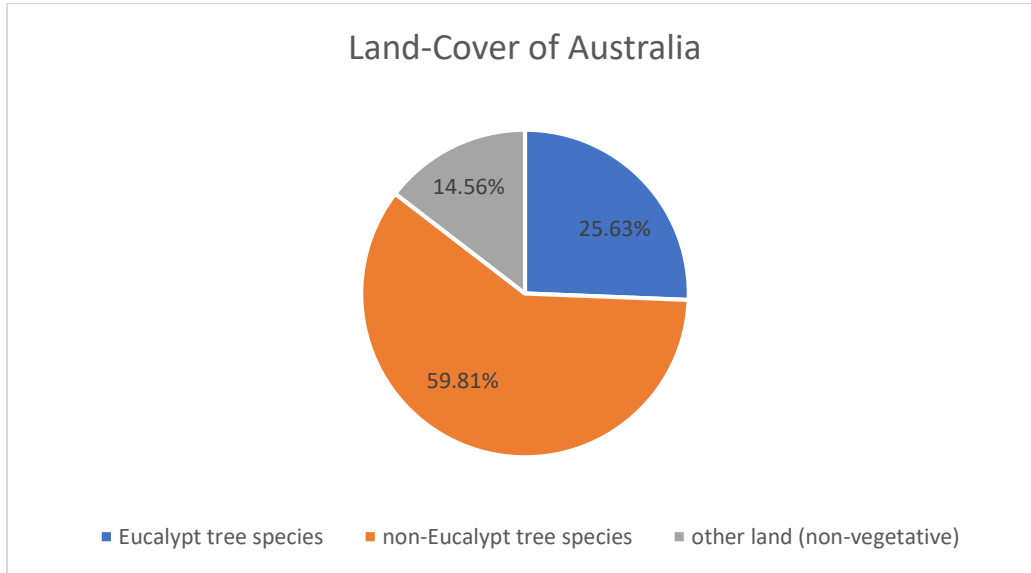

Figure 2: The percentage of Australia's total land area that is covered by eucalypt trees, non-eucalypt vegetation, or non-vegetative land areas (i.e. human habitat, bodies of water, cleared or barren land)

Furthermore, calculations from the 2016 CAPAD (5) map revealed that approximately 154.4 million ha of Australia's total land area (765.9 million ha) is protected by government agencies. Of this protected land, 7.78 million ha (5%) and 15.96 million ha (10%) are located within NSW and Qld respectively.
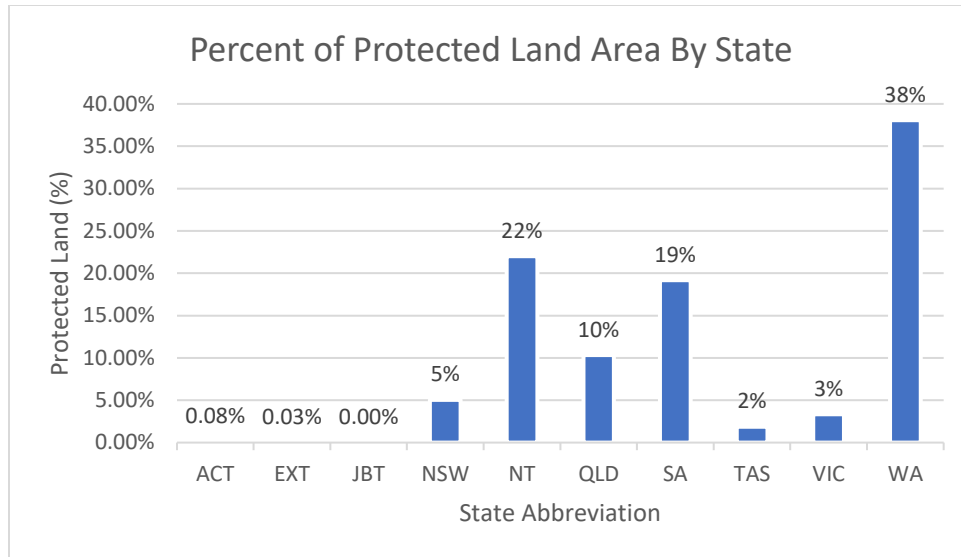
Figure 3: The percentage of protected land per state as a portion of the total protected land area in Australia.

Within Site A and Site C we found evidence of eucalypt trees. However, in Site B we could not identify any eucalypt trees. Within Site A (Pelion Forest Reserve, Qld) we observed eucalypt trees consistently from 2016-2018. This indicates that when in areas of protected land and under environmental conditions these eucalypt tree populations are growing. This area can serve as a significant 'control' for quantifying changes in eucalypt abundance against deforestation rates in other areas of Australia.

Our findings for Site B (Bateman's Bay, NSW) were unexpected. We did not find any evidence of eucalypt trees in this area although we are certain that they are there. Since we know definitively from our 2012 ground-truthed data that eucalypt trees were located within Site B, further investigation into our results must be done using up-to-date ground-truthed data for verification of eucalypt presence or loss. We may have to adjust our bounding boxes or adjust the sensitivity of the ECARR and ECBRR algorithms for this site. We plan to use our ground-truthed data for this region to verify if there are indeed eucalypt trees in the area we observed using satellite-imagery. If the trees are on this area, then we must adjust the algorithms' sensitivity to be able to visualize them in the imagery. If our ground-truthed shows that there are no eucalypts within our bounding box area, we will then select another area within Bateman's Bay where we know the trees are located to assess using satellite-imagery.

Within Site C (Gold Coast, Qld), we analyzed satellite-imagery from 2017 and 2018 we identified the presence of eucalypt tree species. We observed a decline in eucalypt tree abundance in this area from June 2017 to July 2018. In recent years, Gold Coast has been an area of rapid population growth and land use change. The decline in eucalypt abundance is likely due to increasing land pressure and deforestation in the area. However, we will need ground-truthed data or higher-resolution satellite imagery to confirm this hypothesis.

Overall, these results indicate that we can identify eucalypt trees in mixed forests using high-resolution satellite imagery. We can use reflectance ratios to distinguish likely Eucalypt trees and can provide valuable information on changes in Eucalypt abundance.

Discussion

Understanding HeV spillover in Australia required an understanding of the complex ecological systems that naturally exist in the continent and how human interactions with the land influences these systems. Eucalypt tree species were shown to be located predominantly on the eastern coast of Australia when assessing the 2018 vegetation map. The rapid rates of deforestation along Australia's eastern coast play a significant role in the occurrence of HeV spillover. Deforestation along the eastern borders of Queensland and New South Wales is likely a factor for the increased frequency in Hendra virus spillover occurrence within the past decade. Deforestation leads to loss of habitat and winter food (eucalypt tree nectar) for flying foxes and results in HeV spillover events. Understanding and managing HeV spillover requires and understanding of the environmental and ecological consequences of human changes in land use.

The ability to identify eucalypt trees in mixed forests using high-resolution satellite imagery is significant to conservational efforts. Accurate identification of eucalypt trees using satellite-imagery allows us to assess large areas of land in the past and present. The use of satellite imagery, as opposed to data collected from a field team, allows for a quicker assessment of the land. This allows for the quantification of changes in eucalypt tree abundance within our study regions. These measurements will allow us to see how the abundance of eucalypts is changing between study sites. We can also assess the rates of deforestation in these areas to see if they correlate with the observed loss of eucalypt trees.

Further research must be done for the targeting of specific land areas for eucalypt conservation and identification of areas where eucalypt trees have been lost for restoration. Identifying a single grove of eucalypt trees at such high resolution allows for greater accuracy in determining target land areas for conservation and restoration. Our continued research will aim to identify eucalypt trees at higher resolution in addition to analyzing canopy changes for occurrences of flowering events and areas of Eucalypt population decline and loss over space and time. These findings are significant for conservation efforts because a single eucalypt grove can sustain hundreds to thousands of bats throughout the winter. Conservation efforts must happen in a timely manner since it takes 2 decades for eucalypt trees to mature and flying fox populations are currently losing flight capability due to the lack of eucalypt nectar to feed on.

Knowing the current and previous locations of groves of eucalypt trees can aid in minimizing HeV spillover. Deforestation policy changes must be implemented in Australia to decrease the rate at which native vegetation along the eastern coast is cleared. Since flying foxes are pollinators, they have a significant role in the area's ecology. Bat habitat must be sustained in the forests for flying foxes if management efforts for HeV are going to be successful.

Conclusion

HeV spillover is a significant public health issue in Australia. Spillover of HeV has been increasing in frequency in the past decade. Reduction of flying fox migration into human habitat for low quality substitute foods is a key component to reducing the frequency of HeV spillover. This can be achieved by slowing the rate at which forest are cleared in Australia and protecting native trees that serve as flying fox foraging areas. However, the pressure for land by humans and the need for forested habitat by flying foxes continues to thwart conservation efforts. Assessing areas of critical habitat for flying foxes using satellite imagery can produce effective efforts towards reducing HeV spillover. Identifying eucalypt trees within mixed forests using high-resolution satellite imagery provides the necessary data to make conservation efforts effective and occur in a timely manner.

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The Relation Between Perceived and Population Based Environmental Risk and Maternal Stress

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Centia Thomas, McNair Scholar, The Pennsylvania State University

McNair Faculty Research Adviser: Kristin Buss, Ph. D
Professor of Psychology and Human Development and Family Studies
Department of Psychology
College of the Liberal Arts
The Pennsylvania State University

Abstract

Child outcomes can be influenced by many variables, one of the most well-documented variables known to affect child outcomes is maternal interaction. Many studies investigate the relation between maternal interaction and child outcomes, however, very few studies attempt to identify the potential risk factors that may influence the mother's wellbeing and contribute to the way in which she interacts with her child. This current study attempts to identify which environmental risk factors affect maternal stress, and how the difference between perceived and population-based environment risk factors are related to participant's indications of maternal stress. The results of this study suggest that mothers with higher socioeconomic statuses were more likely to report having more indicators of maternal stress. The results of this study also suggested that perceived environmental risk does not have a statistical significance on the severity of maternal stress reported.

The Relation Between Perceived and Population Based Environmental Risk and Maternal Stress

Research suggests that children who are persistently exposed to volatile environments are more likely to present some indicators of negative child outcomes (Leventhal, 2018). The effects of being exposed to an environment with high concentrations of poverty, crime and other environmental risk factors are multifaceted in that they seem to affect children emotionally, socially, and behaviorally (Leventhal, 2018). While an environment can contribute significantly to child outcomes there are factors that can exacerbate, or avert the direction of this relation, one of these factors is maternal interaction. The role that a mother plays in the life of her child can be one that promotes positive outcomes, in which case the mother's behavior towards, and interactions with, her child protects the child from the negative aspects of the environment. Adversely, a mother could, for any number of reasons, worsen the circumstances, causing the child to be exposed and vulnerable to the environmental risk factors and thus promoting negative child outcomes (Defalco et al., 2014).

Children are impressionable, this is a well-known fact because of the emphasis that is typically placed on children in research investigating the relation between environment and life outcomes. While many studies focus on the way in which environment impacts the child, few articles investigate the way in which the environment affects the mother, and in turn how this relation may impede a mother's ability to provide adequate and positive interaction with her child.

In research environment is an elusive construct. The definition of environment varies significantly among research articles and studies. Some researchers define environment broadly, considering the term to encompass any aspect of an individual's life that was not genetically inherited. Others define environment with stricter confines, operationally defining it as pollution, or the spread of infectious diseases (Schmidt, 2007). While both definitions would be considered correct, there are also instances of researchers adopting a more general conceptualization of environment which encompasses both broad and more narrow perspectives of environment. This way of conceptualizing environment defines it as a combination of both perspectives and attempts to investigate psychosocial components that may not have been considered by either of the other perspectives (Schmidt, 2007).

Understanding the versatile definitions of environment is essential to grasping the ambiguous nature of environmental risk factors. Variables considered to be environmental risk factors varies between studies, however they are similar in that they may cause some level of distress in an individual who is exposed to the variable of interest. Some of the factors that have been operationally defined as environmental risk factors include socioeconomic status (SES) and neighborhood safety.

Literature Review

Socioeconomic Status

Like environment, SES is a construct that is ambiguous in the way that it is defined within research. While social scientists have not necessarily come to a consensus on what SES encompasses, the variability between definitions of SES in different studies is far less than that of environment. Research in the field of psychology typically uses SES as a construct to represent capital or resources, whether they be of a monetary or resources and assets of another nature (Bradley and Corwyn, 2002). There are two opposing theories regarding the relation that socioeconomic status has to the development of psychopathology in individuals. One theory, typically referred to as the social selection theory, claims that mental illnesses render individuals' incapable of fulfilling their societal roles, and as a result these individuals begin to drift down the societal ladder. The other theory, the social causation theory, suggests that people develop their illnesses because of their low SES. Research has also suggested the existence of a significant relation between socioeconomic status and the development of psychopathology (Wadsworth and Achenbach, 2005). A study conducted by Martha E. Wadsworth and Thomas M. Achenbach tested the way in which SES affects the incidence and prevalence of cases of psychopathology.

They hypothesized that a higher incidence of new cases and cumulative prevalence of psychopathology would be found in groups of lower SES as opposed to those who are middle and high SES. To test their hypothesis, the researchers examined the self-report measures and interviews of 1,075 participants. The results of this study supported their hypothesis by revealing disproportionately higher incidence and prevalence of mental illnesses among the participants of a lower SES (Wadsworth and Achenbach, 2005).

Neighborhood Safety

Research suggests that the conditions of the neighborhood in which a child resides is another important component when considering factors that may have a impact on child outcomes. A study conducted by Dafina Kohen, Tama Leventhal, V. Dahinten and Cameron McIntosh sought out to explore the relation between a child's neighborhood and their verbal and behavioral outcomes. This study found that children from neighborhoods that were considered disadvantaged were significantly related to children with poor child outcomes, by influencing other variables that have significant interactions with child outcomes negatively (Kohen, Leventhal, Dahinten, & McIntosh, 2008).

Maternal Anxiety and Depression

Maternal mental illnesses, such as anxiety and depression, and their relation to child outcomes have been heavily investigated. Multiple studies have found a moderately significant relationship between postnatal depression within the first two years of a child's life, and a child's delayed cognitive and emotional development (Beck, 1998 & Letourneau, Tramonte & Willms, 2013). Cheryl Tatano Beck's meta-analysis of nine studies on postpartum depression and their relation to the cognitive and emotional development of their children FINISH. When selecting the articles use in her meta-analysis, Beck sought out studies which focused on the way that cognitive and emotional were impacted by postpartum depression. After analyzing the nine articles she determined that mother's postpartum depression did have a significant relation to children delayed cognitive and emotional development.

Current Study

This current study seeks to investigate the relation between environmental risk factors and maternal stress. For the purposes of this study, environmental risk factors have been examined as they are perceived by the mother, as well as through statistical information obtained by geocoding. Maternal stress has been operationally defined as the presence of symptomology or a diagnosis of depression or anxiety disorder. The research questions being investigated throughout this study are 1. Which environmental risk factors affect the presence of indicators of maternal stress, and 2. Does a mother's perceived environmental risk factors affect maternal stress more than the population based environmental risk factors. I hypothesize that as SES goes down, crime index and perceived environmental risk factors increase maternal stress will increase with it.

Secondly, I hypothesize that as perceived environmental risk factors increase maternal stress will increase regardless of population based environmental risk factors.

Method

Participants

The participants included in this study are a subsample of 90 mothers from the larger subject pool of an ongoing longitudinal study. The longitudinal study functions to investigate the development of attention and emotion in children at various points of development. In order to take part in the study participants were required to have had full term pregnancies, a birth that was free of complications, and a healthy child who was over five pounds at birth. Participants were recruited based on geographic location. Participants who were recruited from a larger urban city on the east coast, were contacted after the mothers gave birth in the hospital. Other participants were recruited from a small, mid Atlantic, rural city. Researchers became aware of these participants through birth announcements, after which the participants were contacted for inclusion in the study through the distribution of postcards and the parent's volunteering. The last group of participants were from a small mid Atlantic urban city. Researchers contacted participants from this location through community centers, housing authorities and community engagement centers.

Procedure

Participants are asked to comply with assessments taking place when their child is 4 months, 8 months, 12 months, 18 months and 24 months as a part of their participation in the longitudinal study. The assessments require the participants to complete self-report measures and to attend "lab visits." To compare a participant's perceived environmental risk to population based environmental risk, the mother's perceived environmental risk is determined through evaluating their responses to self-report measures administered to them. Population based environmental risk are determined by evaluating neighborhood statistics related to the variables of interest. After evaluating both components by running statistical analysis on the data.

Measures

Community Survey. The Community Survey is a self-report questionnaire that was designed to assess aspects of the participant's neighborhood. The Community Survey consists of various scales, however the scales that were analyzed throughout the course of this study include those that measure delinquency rates, perceived violence, neighborhood danger and anomie ("Community Survey", n.d.). The delinquency rate scale consists of three items with a four-point Likert Scale response format. The perceived violence scale consists of five items with a four-point Likert Scale response format. The neighborhood danger scale consists of three items with a four-point Likert Scale response format. The anomie scale consists of 5 items with a five-point Likert Scale response format ("Community Survey", n.d.). Within this study the Community Survey was used to obtain some indicator of perceived environmental risk factors.

Beck Depression Inventory (BDI). The Beck Depression Inventory is a self-report questionnaire which is used to measure attitudes and symptoms commonly associated with depression. The inventory consists of 21 items (e.g. This week… I do feel sad, I do not feel said, I feel sad all the time and can't snap out of it, I am so sad or unhappy that I can't stand it.) with a four-point response format ranging from 0-3, where higher scores indicate severe depression (Beck, Steer & Carbon, 1988). The results are evaluated after summing up the participant's responses to each item. The possible scores range from zero to 63, participants whose scores fall between zero and 10 are experiencing normal mood fluctuations, scores falling between 11 and 16 indicate mild mood disturbances, scores falling between 17 and 20 indicate borderline clinical depression, scores falling between 21 and 30 indicate moderate depression, those whose scores are 31 and over are experiencing severe or extreme depression (Beck et al., 1988). The BDI has an internal consistency that ranges between .73 and .92, and a construct validity of .92 for psychiatric outpatients and .93 for college students (Beck et al., 1988). In this study the BDI was used as a measure of maternal stress. High scores on the BDI indicated more severe maternal stress.

Beck Anxiety Inventory (BAI). Beck Anxiety Inventory is a self-report questionnaire used to measure the severity of anxiety in adults and adolescents. It does so by measuring the presence of subjective, neurophysiologic, autonomic, and panic-related symptomatology (Beck, Epstein, Brown & Steer, 1988. The BAI consists of 21 items (e.g. During the past month, including today, I have been bothered by numbness or tingling) with a four-point response format with answers ranging from zero to three. A participant's scores may range from zero to 63 points (Beck et al., 1988). Scores ranging from zero to seven indicate minimal anxiety, scores ranging from eight to 15 indicate mild anxiety, scores between 16 to 25 indicate moderate anxiety, and scores 26 through 63 indicate severe anxiety. The BAI has an internal consistency ranging between .92 and .94, and a test-retest reliability of .75 (Beck et al., 1988). In this study, the BAI was used as a measure of maternal stress. High scores on the BAI translated to more indicators of maternal stress.

State Trait Anxiety Inventory (STAI). The State Trait Anxiety Inventory is a self-report questionnaire which measures trait and state of anxiety. The inventory consists of 40 items, 20 items which assess trait anxiety (e.g. I get in a state of tension or turmoil as I think over my recent concerns and interests) and 20 items which assess state anxiety (Barnes, Har, & Jung, 2002). The Inventory has a four-point response system, with responses ranging from "Almost Never" to "Almost Always" (Spielberger, 1989). Each item is assigned a weighted score based on the response of the participant. For ten S-Anxiety and eleven T-Anxiety items a response of 4 indicates high anxiety, however for the remaining items a high rating indicates an absence of anxiety ("State-Trait Anxiety (STAI)", n.d.). The STAI has an internal consistency ranging between .86 to .95 and has a test-retest reliability ranging between .65 to .75 ("State-Trait Anxiety (STAI)", n.d.). In this study the trait component of the STAI was used as an indicator of maternal stress, where a higher score on trait anxiety scale translated to higher maternal anxiety.

Geocoding. Geocoding is the twostep process of assigning statistics to a specific geographic location. The first step in the geocoding process is obtaining the address of interest and deriving the census tract and block group of that address. After collecting the census tract and block group of the address, the census tract and block group is put into americanfactfinder.com, which provides statistics about variables of interest pertaining to that specific geographic location. Geocoding was used as a measure of population based environmental risk factors, such as school dropout rates, poverty and income rates, and the prevalence of single parent households within the community.

Crime Index. Crime Indexes were obtained by referencing city-data.com, which is a website that compiles city level statistical information and provides comprehensive views of cities in America. The crime index is a numerical measure based on the average of crime that occurring per 100,000 individuals. Both the national and the local crime indexes are provided. For the purposes of this study, the crime index was used as a measure of an additive component of the population based environmental risk factors, with crime index representing neighborhood safety. A higher crime index is representative of lower neighborhood safety.

Results

The correlational analyses ran on the data suggest that the environmental risk factor that has the most significance on maternal stress is SES, which seems to be related to maternal stress in such a way that as SES increases maternal stress increases as well. The correlations found in this study did not support any significant relation between perceived environmental risk and maternal stress.

Findings

Since this study is a correlational one, one of the limitations that exists is that the correlations discovered through the study do not prove causation. Another limitation that exists in this study is that the process of geocoding is reliant on information provided by the census. The statistics provided through geocoding reflect the information provided by the 2016 census.

The results of this study provide researchers with an indication of structural changes that can be made to communities to promote maternal wellbeing. The results of this study ignite more questions into the relation between SES and maternal stress, and what contributes to this relation existing in the way that it does. The reasoning behind this study producing the results that it did could be related to the how mothers adapt to their surroundings. Mother's living in environments with high concentrations of risk factors could be adapting to the risk that surround them, and because of this process of habituation, these mothers may not be viewing the risk factors in their community as negatively as mother's in environments with less environmental risk factors would.

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