

# 6th Annual Baltimore County Public Schools Student Independent Research Symposium - May 21, 2018

## AGENDA

**6:00 - 6:10 Sign In and Refreshments**

**6:10 - 6:30 Welcome and Recognition of Student Researchers**

Be seated in the Library for welcome remarks and presentation of Certificates of Achievement.

**6:30 – 8:00 Student Research Presentations**

Proceed to one of the Presentation locations for the duration of the program.

*Please feel free to ask questions about students' research following the presentations  
and use the provided Comment Cards to share feedback with student researchers.*

## STUDENT RESEARCH ABSTRACTS

**Catonsville High School**

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Christie Rigilano, Library Media Specialist

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**Daniel Li**

Junior, Catonsville High School

**Title:** A Study of the Relationship between Neuroimaging and Schizophrenia

**Abstract:**

Schizophrenia is a serious and potentially disabling mental disorder that affects how a person thinks, feels, and behaves. Although schizophrenia affects millions of people of all ages around the world, much is still unknown about the illness, leading to problems with its diagnosis and treatment. Developments in neuroimaging technology that provides a closer look into the brain can give us a deeper understanding of schizophrenia. Common symptoms of schizophrenia such as psychosis or sensory gating deficits will be investigated to determine if using neuroimaging can provide a consistent diagnosis. Using Neuroimaging technology, Patient and Control groups will undergo sensory gating tests, and their brain activity maps will be evaluated to identify any similarities or differences that can be used for diagnosis. Other studies related to this topic will be examined to identify possible causes or definite symptoms of schizophrenia. Findings regarding temporal lobe activity and dopamine hyperactivity will be discussed, and future direction regarding the potential of neuroimaging will also be explored.

Additional information about schizophrenia be found on the National Institute of Mental Health (NIMH) Health Topics page at:

<https://www.nimh.nih.gov/health/topics/schizophrenia/index.shtml>.

**Seon Tromble**

Senior, Franklin High School

**Title:** Seeing the Unseeable: VLBI Scans of a Black Hole in Multiple Wavelengths

**Abstract:**

This project aims to understand how new technologies in the field of astrophysics may better allow us to gain a greater understanding of the mysterious cosmic phenomenon known as black holes. While multiple innovations will be studied, the most relevant with concern to the desired research is the Very Long Base Interferometry technique. VLBI includes an array of observatories simultaneously focusing at a single point, essentially creating a lens the size of the area between the observatories. This provides a resolution much larger than any comparable techniques. Furthermore, the addition of observatories scanning in different wavelengths of the electromagnetic spectrum would reveal details of the nature of a black hole that could not be discerned collecting data in visible light. The employment of a VLBI technique that includes multiple wavelengths will allow researchers to accomplish the objective of gaining an increased understanding of the nature of black holes, creating a more comprehensive understanding of the universe we live in.

## **Jahvani Greenaway**

Senior, New Town High School

**Title:** Black Male Image

For my research statement thesis I've composed a research investigation where my focus will be the focus on the youth of the "black male image" the short-comings and daily life of crime, drugs, sex industry, and how the music industry and Hip Hop has affected and put a stereotypical imagery on African American males predominantly. In this research I'll be using sources pulled from my own research of male actors, Hollywood films and men's rights activist who speak on these issues and public affairs. Hollywood have given many descriptions that portray negative images in today's society. My purpose of research is to encourage my audience ask questions and wake up to reality and see the real as it is. My research was based on the purpose of discussing the downfalls and economics and family issues for children and teenagers in inner city neighborhoods and African American communities. One resource I used in particular was a book titled "The Assassination of the Black Male Image," by the Earl Omari Hutchinson.

## **Kayla Lilley**

Senior, New Town High School

**Title:** Concussions in Football: The Why, the What, and the Prevention

Concussions in football have brought a lot of fear and questions to past, present, and future football players because of what the trauma can do to them long term. This research aims to address: why and how do concussions in football occur, symptoms they cause, and concussion prevention. In addition, will the evidence found on concussions in the NFL/NCAA persuade little league football to go away or raise the age of participants? Will it threaten to end the NFL? The content area of my research stems from Social Sciences because I am focusing on the health effects of concussions and how science and medicine are changing to prevent them. This research was conducted by looking into the findings of other researchers on this topic as well as conducting a few interviews with football players myself. The objective of this research is to inform younger generations who are playing football or thinking about playing football, the potential risks ahead of them, as well as to inform them how to better protect themselves and prevent concussions.

## **Joanay Tann**

Senior, New Town High School

**Title:** How Sexual Violence Affects Future Generations of American Culture

Victims of sexual violence must deal with severe emotional trauma. When someone is raped or sexually abused, they have damage to both their mind and body. As a high school senior about to go to college, I became concerned about what systems college campuses, workplaces, and even the military had in place to combat sexual violence. If America does not do something to prevent and eradicate sexual violence, it will have a negative impact on how women are viewed, the behaviors we teach our children, and the overall rate of sexual assault and harassment may increase even more. Research in the form of interviews, testimonies from public figures, and reading academic journals provide support for this need. This research aims to inform people about the various types of sexual violence, the effects it has on one's psyche, why victims suppress the sexual acts committed towards them, and how American citizens can change improve various environments to make them comfortable for all people.

## **Julia Coleman**

Senior, Owings Mills High School

**Title:** Microplastic Quantification in Maryland Soil

Abstract:

The daily usage of plastic has many societal benefits, but has significantly impacted the environment since its invention. As the environmental concern grew for plastic disposal, the issue of microplastics (defined as being a plastic particle under 5mm in size) arose. These contaminants end up in oceans via breakdown of larger plastic litter, and through the wastewater of billions of households around the world. This issue, while still relatively new to the science field, has been extensively studied in the oceanic ecosystem. In contrast, very little research has been done on microplastic contamination in terrestrial environments. The research that has been done displays inconsistencies through microplastic quantification procedures. In this experiment, a set of microplastic extraction procedures were developed in order to determine the presence of microplastic particles in the top 5 inches in sampled Maryland soils. It is hoped that this extraction process will be used in future experiments in order to provide reliable information to researchers about the microplastic issue.

**Title:** Decreasing Incidents of Vector Borne Illness in El Nino Southern Oscillation Impacted Areas

**Abstract:**

Global climate change has imposed various effects on overall human health. Infectious diseases affect different locations worldwide due to their climate and development. Among the infections caused by global climate change are food-borne and water-borne illnesses. The impacts of vector-borne illness such as Zika and dengue-fever are expanding due to an increase of vector mosquito's populations. The impact on the link between climate change and vector-borne disease has been a critical topic of interest in research for decades. The average global temperature has increased, disrupting the current weather patterns that allows for longer incubation periods for vector mosquitoes. The effects of global warming eventually lead to significant increase of vector diseases transmission as temporal and geographical distribution of vector-borne illness spread. Souths America's deals with the highest rates of infectious diseases worldwide. The recent frequency of hurricanes and ocean warming provide a reasoning to the increase of vector-illnesses to inhabit the climate. This study analyzes the recent increase of climate temperature and disease spreading in the warmer, humid climates in the tropics of South America. In the tropics, El Niño or ENSO (El Niño-Southern Oscillation) is a naturally occurring event in the equatorial region which causes temporal changes in the world climate. The study will be conducted using data analysis. Further research on the impacts of global climate change on vector-illnesses and impacted future should be conducted to raise global climate preventions, awareness of ENSO, and plans to aid countries with high infection rates. My proposed research involves measurement of the vector population located in the Southeast Brazil state of Rio Do Sol to evaluate the temporal disruption of El Niño. By measuring the rate of increased precipitation, we will be able to compare with the measurement of infected population and population of the *Aedes aegyptis*. With help from the Vector Ecology Management, who were able to create a cost-efficient spray, a communitywide spraying to kill adult mosquitoes could be important for reducing pest populations in a hurry.

**Title:** The Journey to Gender Equality: How Faith Will Fight for Women

**Abstract:**

For many centuries, women have been treated as second class citizens within the South Asian region. Statistics show that female literacy within this region is extremely low, especially when compared to that of males. Conversely, there is a very high rate of child marriage and rape within South Asia. To raise the status of women and bring an end to the inequalities they face, this research will explore how religion can be used to bring an end to the cycle of female disempowerment in this region. If women are more educated within a region the standard of living would drastically improve because women would be more capable of being active members of society. The methods explained within this proposal focus on how homeschools based on teaching religious lessons can evolve into formal schools teaching students a variety of subjects. The purpose of this proposal is to highlight the steps we would take to establish a functioning school in an underdeveloped South Asian town. To manage the project staffers will be needed as well as the support of local assistance from politicians, land owners, and people who have many connections and knowledge of the areas in question. The initial budget needed to complete this project would require a large amount of seed money. The costs will be broken down into the money spent in America for the sake of the headquarters and the money spent in our test areas for the sake of data collection and schools. The costs calculated are only for the first year of the project. Many of the resources will rollover into the next years, and many of the costs like employee salaries will be constant. Although more of the budget will be allotted towards American headquarters, it must be noted that living in foreign countries tends to be cheaper, and in the first year a lot of the long-term supplies need to be purchased. In the end, our budget is projected to be \$1.25 million for the first year alone. The expected duration of the first test case, which I plan to do in Manzarabad, Pakistan would be three years. After three years, the project should have made some difference. We should be able to measure how well the program is doing and how it can be expanded on.

## **Keny Shah**

Senior, Parkville High School

**Title:** The Detrimental Effects of Poverty and Discrimination on the Development of Individuals and Nations

### **Abstract:**

This research proposal addresses social issues that some people are reluctant to address. Poverty and discrimination are increasing day by day. Quick fixes will not work, and while we cannot change who people are, we can change their perspective on certain issues. It is very heart-breaking to know that even in a country like the United States, millions of people are facing discrimination and are victims of poverty. In America today, about 45 million people live in poverty (Gongloff, 2014). Most people living in this condition are minorities, with the highest rate of poverty being amongst Native Americans, which is around 27% (USCB, 2013). There is a significant relationship between discrimination and poverty. Discrimination influences poverty, and poverty may isolate some people and impose a social stigma on them, which results in discrimination. That's how one induces the other. Discrimination and poverty are barriers in the development process of countries, as they affect people physically, mentally, and socially and hurt the nation economically as well. My research questions were, "How are poverty and discrimination connected, and how do they affect each other?" and, "Why is poverty increasing instead of decreasing, when there are thousands of social organizations in place to help people?" My research proposal will attempt to answer these questions and suggest new methods to help alleviate poverty and discrimination.

## **Hailey Ludwig**

Senior, Patapsco High School and Center for the Arts

**Title:** Applications of 3D Printing for More Affordable Prosthetics

### **Abstract:**

The use of 3D printed limbs is nothing new to the medical world. My research was not to introduce a new idea, but discover why 3D printing has not become mainstream. With approximately two-million people living with limb loss, and only a small percentage being able to afford the old school, yet advanced prosthetic technology, why aren't we pushing the cheaper alternative? My original hypothesis was that 3D printing was not yet readily accessible. I was proven wrong through my discovery of the E-nable project and other sources. What is the missing piece of the puzzle then? The problem is not the accessibility, but the capabilities of a three-dimensional printer. Current 3-D printers do not produce prosthetics that can mimic the human body as well as the old school prosthetics.

## Jay Vaughn

Senior, Patapsco High School and Center for the Arts

**Title:** Men's Poor Mental Health

**Statement of purpose:** A large population of men today are struggling from various issues stemming from poor mental health. These health problems have a variety of effects, like violence derived from untreated mental issues.

**Background:** What lead me to research this topic was myself as a male. I've been plagued by emotions and feelings I don't understand, and I know I'm not alone. I want to gather information and put it out there in an easy to understand explanation for other men like me to access.

**Description:** I will be gathering information from scholarly articles about the issue and from psychologists and other mental health professionals.

**Significance:** This topic is extremely important in the fact that everyone has men in their lives, whether it be a brother, friend, husband, father, etc. Understanding the reasons why men behave the way they do will help with how we handle this mental health crisis, and how you personally can help some of the men in your life, or guide them to getting the help they need and deserve.

**Methodology:** In addition to information gathered from mental health professionals and articles on the issue, my methodology will be to obtain information from my peers in response to the question "What do you do when you feel upset?" I plan to compare these survey results with national statistics on how men handle these emotions.

## Naima Camara

Senior, Randallstown High School

**Title:** Buildings, Communities, and Social Spaces: How Architecture Influences Communication and Social Interactions

**Statement of purpose:** America culture is individualistic. We have created structures called communities; however, we did not consider how these structures would influence communication and social behaviors. A community without communication is not a community. Using architectural determinism, architects can create unique designs that can enhance communication in communities.

**Background:** My mother lived in Columbia, Maryland when it was a relatively new development. She would tell me how people from many different faiths, ethnic backgrounds, and cultures would come together and support one another. This was possible because Developer James Rouse, the founder of Columbia, Maryland, used architectural determinism to create a community that fostered communication and promoted positive social interactions. I greatly admire his vision, and aspire to one day develop a similar community.

**Significance:** There are three main parts of a community: a person, the other person, and their environment. Manipulating the environment can create a connection between these individuals. "Why is that important?" Environments that have a positive influence on communication and social interactions are known to enhance productivity, mental health, and overall quality of life.



## **Justin Delgado**

Senior, Randallstown High School

**Title:** Putting the Brakes on Train Derailment with Positive Train Control

**Statement of Purpose:** This research aims to identify factors that contribute to train derailments and viable technological innovations that can reduce these costly and in some cases deadly accidents.

**Background:** I have been interested in mechanics and technology for as long as I can remember. My fascination with trains evolved from my love of cars and helping my dad work on cars, trucks, and even lawnmowers.

**Significance:** The environmental and financial consequences of a single train derailment can cost more than 100 million dollars a day. More importantly, it is essential to find solutions to avoid these derailments to save lives.

## **Cameron Isaacs**

Senior, Randallstown High School

**Title:** First Aid for the U.S. Healthcare System: Revolutionizing Medicine with the Placebo Effect

**Statement of purpose:** The U.S. government has struggled to create affordable healthcare for their citizens. Annually, Americans spend thousands of dollars for medicine and medical treatments. The aim of this research is to determine if the Placebo Effect could be the game changer the U.S. healthcare seeks.

**Background:** As I prepare for the transition to college, I have chosen to major in pharmaceutical studies. I have a deep interest in pharmaceutical research which involves identifying and exploring health issues, problem solving, and discovering solutions. This investigation has provided me with a glimpse into my future career.

**Significance:** Americans are wasting money on name brand drugs and other healthcare related treatments. Research has shown that psychologically, patients that take placebos are experiencing about the same results as patients who receive traditional medication and undergo conventional medical procedures. Undoubtedly, the Placebo Effect could be the pathway to a new affordable healthcare system for the U.S.

## Acknowledgements



### **We wish to thank ...**

Administrators and School Counselors at Catonsville, Franklin, New Town, Owings Mills, Parkville, Patapsco, and Randallstown high schools for offering this unique elective course at their schools.

Library media specialists, content area teachers, and school to career transition teachers at each high school for facilitating independent student research this year.

Mentors who have provided students with research support and expert guidance.

Parents and families for supporting their students with the rigorous demands of this course.

Student researchers for their passion, creativity, and commitment to this research.

BCPS Library Media Programs & Digital Resources staff in the Office of Innovation & Digital Safety, for maintaining the online Research Framework and course curriculum and coordinating the Symposium.

BCPS Office of Career and Technology Education/School to Career Transition staff for guidance with mentorships and field experiences.

Faculty and staff at New Town High School for hosting the Symposium.

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BCPS Copy and Print Services staff for their professional printing services