The Penn State McNair Journal

Summer 2011, Volume 18

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McNair Scholar Articles

WELCOME

Since 1991, the Penn State McNair Scholars Program has enriched the lives of students at Penn State. The McNair Program holds a very special place in our lives, as well as in the lives of the faculty and staff who work with our students. This publication celebrates their achievements and we offer it to our readers with pride and pleasure.

This is the eighteenth issue of the Penn State McNair Journal. We congratulate the 2011 Penn State McNair Scholars and their faculty research advisors! This journal presents the research conducted in the summer of 2011 by undergraduate students from Penn State who are enrolled in the Penn State McNair Scholars Program.

The articles within this journal represent many long hours of mutual satisfying work by the Scholars and their professors. The results of their research are published here and have also been presented at various research conferences around the country. We are especially proud to see how these students have grown as researchers and scholars. The hard work, dedication, and persistence required in producing new knowledge through research is most evident in these articles.

We very much appreciate the guidance, expertise, caring and patience of our fine group of Penn State faculty research advisors. For their ongoing support and assistance, we thank Rodney Erikson, President of Penn State University; Robert Pangborn, Interim Provost and Dean of Undergraduate Education; Hank Foley, Senior Vice President of Research and Dean of the Graduate School; Regina Vasilatos-Younken, Associate Dean of the Graduate School, and Suzanne Adair, Assistant Dean and Senior Director of the Office of Graduate Educational Equity Programs, the administrative home of the McNair Scholars Program.

We are also fortunate to have the support and encouragement of many faculty and staff members who have worked with our students as social mentors or who have presented workshops and seminars on the many aspects of graduate and faculty life. You give the most precious of gifts to our students – your time in volunteering to support, encourage and nurture our Scholars' hopes and dreams.

Teresa Tassotti
Project Director

TRIO PROGRAMS ON THE NATIONAL LEVEL

Since their establishment in the mid-sixties as part of Lyndon Johnson's War on Poverty Program, the federal TRIO Programs have attempted to provide educational opportunity and make dreams come true for those who have traditionally not been a part of the educational mainstream of American society. The TRIO programs are funded under Title IV of the Higher Education Act of 1965. While student financial aid programs help students overcome financial barriers to higher education, TRIO programs help students overcome class, social and cultural barriers to higher education. There are eight TRIO programs, which include the original three – Upward Bound, Talent Search and Student Support Services. The additional programs are Educational Opportunity Centers, Upward Bound Math & Science Centers, the Ronald E. McNair Post-Baccalaureate Achievement Program, Veterans Upward Bound, and a training program for TRIO staff. McNair programs are located at 202 institutions across the United States and Puerto Rico. The McNair Program is designed to prepare participants for doctoral studies through involvement in research and other scholarly activities.

TRIO PROGRAMS AT PENN STATE

The 11 TRIO Programs at Penn State comprise six of the nine TRIO programs. There are two Educational Opportunity Centers, one in Philadelphia and the other serving southwestern Pennsylvania, two Talent Search Programs serving western Pennsylvania and the city of York, Ronald E. McNair Scholars Program, four Student Support Services Programs, Upward Bound, and Upward Bound Math & Science. These programs annually serve more than 6,000 students, from 6th graders through adults, all with clear potential for academic success. The programs operate at the following Penn State campuses: University Park, Wilkes-Barre, Greater Allegheny, and the Pennsylvania Institute of Technology. The programs also operate in communities across the state, often linking with middle schools, high schools, and community agencies. The programs focus on helping students overcome economic, social, and class barriers so that they can pursue education beyond high school.

MCNAIR SCHOLARS PROGRAM AT PENN STATE

Designed for low-income and first-generation college students, and students from groups underrepresented in graduate education, the McNair Scholars Program at Penn State encourages talented undergraduates to pursue the doctoral degree. The program works closely with these participants through their undergraduate career, encourages their entrance into graduate programs, and tracks their progress to successful completion of advanced degrees.

The goal of the McNair Program is to increase graduate degree attainment of students from the above-mentioned underrepresented segments of society. McNair Scholars are presented with opportunities to study and do research in the University's state-of-the-art facilities in order to hone those skills required for success in doctoral education. Through both academic year and summer program components, McNair Scholars are required to complete a series of steps that lead to their application and enrollment in a graduate program of their choice.

Since 1991, the McNair Scholars Program at Penn State has helped 221 students earn their baccalaureate degrees. Of these graduates, 181 or 82 percent have gone on to graduate school at institutions across the country and overseas. As of March 2012, 44 or 20 percent have earned their doctoral or professional degrees and another 67 or 37 percent have earned their master's degrees only. Currently, there are 53 or 24 percent of alumni who are still enrolled in graduate programs. Among the institutions McNair alumni have attended or now attend are: Arizona State, Boston University, Columbia, Cornell, DePaul, Harvard, Howard, Indiana University-Bloomington, Iowa State, Johns Hopkins, New York University, Ohio State, Penn State, Purdue, Rice University, Rutgers, Stanford, Temple, Texas A&M, UCLA, University of California-Berkeley, University of California-Davis, University of Chicago, University of Florida, University of Georgia, University of Illinois-Urbana Champaign, University of Maryland-College Park, University of Michigan, University of North Carolina-Chapel Hill, University of Pennsylvania, University of Texas-Austin and Yale, to name just a few.

Summer 2011 McNair Scholars and Program Staff

Summer 2011 Penn State McNair scholars and program staff gather together during the 2011 National Penn State McNair Summer Research Conference held July 8-10, 2011 on the University Park campus.

ABOUT RONALD E. MCNAIR

Dr. Ronald Erwin McNair, the second African American to fly in space, was born on October 21, 1950, in Lake City, South Carolina.   In 1971, he received a Bachelor of Science degree, magna cum laude, in physics from North Carolina A&T State University. He continued his education at the Massachusetts Institute of Technology (MIT) where, in 1976, he earned his Ph.D. in physics.

While at MIT, McNair performed some of the earliest development of chemical and high-pressure CO lasers. He went on to study laser physics at E'cole D'ete Theorique de Physique in Les Houches, France. He was well published and nationally known for his work in the field of laser physics through the Hughes Laboratory.

In 1978, McNair realized his dream of becoming an astronaut when he was selected from a pool of several thousand applicants to be included in the first class of thirty-five applicants for the space shuttle program. Ronald McNair and six other astronauts died on January 28, 1986 when the space shuttle *Challenger* exploded after launching from the Kennedy Space Center in Florida.

McNair was an accomplished saxophonist; held a sixth-degree, black belt in karate; and was the recipient of three honorary doctorates and a score of fellowships and commendations. He was married to the former Cheryl Moore and is the father of two children, Reginald Ervin and Joy Cheray. After his death, Congress approved funding to honor the memory of McNair by establishing the Ronald E. McNair Post-Baccalaureate Achievement Program, which became the sixth program funded under the TRIO Programs umbrella.

"Historians, who will write about McNair, the man, will discover that there was much more to him than his scholastics achievements. Friends who knew him, say he walked humbly and never boasted about his achievements. They say his commitments were to God, his family and to the youths he encouraged to succeed."
 (Ebony, May 1986)

SPECIAL ACKNOWLEDGEMENTS

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McNair Alumni on the Move

We congratulate our recent graduates and are very proud of their accomplishments. We also extend congratulations to those Penn State McNair alumni who have earned their graduate degrees as well as those alumni currently enrolled in graduate studies.

At the graduate level...

Mimi (Abel) Hughes (PSU 2002)	M.S., University of California-Los Angeles
	Ph.D., University of California-Los Angeles
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Omotayo Banjo (PSU 2004)	Ph.D., Penn State University
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Laurian Bowles (PSU 1999)	M.A., University of London,
	M.A., Ph.D., Temple University
Aaron Brundage (PSU 1995)	M.S., Penn State University
	Ph.D., Purdue University
Jose Buitrago (PSU 1995)	M.L.A., Harvard University
Sherese Burnam (PSU 1999)	M.A., University of Central Florida
Saalim Carter (PSU 2007)	M.A., University of Chicago
Debbie Charles (PSU 001)	M.S., University of Maryland-College Park
	V.M.D., Tuskegee University
Jacqueline Cauley (PSU 2009)	M.A., Queen's University (Belfast)
Sofia Cerda-Gonzalez (PSU 1999)	D.V.M., Cornell University
Andra Colbert (VSU 2005)	M.Ed., Johns Hopkins University
Michael Collins (VSU 2005)	M.D., Howard University
Trinaty Crosby (PSU 2005)	M.S.W., Howard University
Evelyn Cruz (VSU 1996)	M.S., University of Virginia
Lurie Daniel (PSU 2000)	J.D., New York University
Natasha Deer (PSU 1995)	M.A., Florida State University
Alicia DeFrancesco (PSU 1997)	M.B.A., Babson College
Jorge Delgado (PSU 2004)	M.S., Purdue University
Eve Dunbar (PSU 1998)	Ph.D., University of Texas-Austin
Latia Eaton (VSU 2003)	M.S.W., University of Baltimore
Carol Elias (VSU 1997)	M.Ed., Virginia State University
Mark Elwell-Heyler (PSU 2002)	M.S., Cornell University
Felecia Evans-Bowser (PSU 2002)	M.S., Texas Tech University
Nakesha Faison-Ajai (PSU 1999)	M.S., Penn State University
	M.A., University of Michigan
Max Fontus (PSU 1999)	M.S., Ph.D., Indiana University-Bloomington
Tiana Garrett (VSU 2001)	M.P.H., Ph.D., University of North Carolina-Chapel Hill
Michael Godeny (PSU 2002)	Ph.D., University of Florida
Antoinette Gomez (PSU 1994)	M.S., Clark-Atlanta University
	M.S.W., University of Denver
Cristina Gonzalez (PSU 1999)	M.D., Albert Einstein Medical School

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Oneximo Gonzalez (PSU 2007)   M.S., University of Pittsburgh
Kathy Goodson (VSU 2005)   Ph.D., University of Maryland-College Park
Sherie Graham (PSU 2002)   M.P.H., University of Michigan
Derek Gray (VSU 1998)   M.L.A., SUNY-Albany
                                     M.A., SUNY-Albany

Mark Harewood (VSU 2000)   M.A., Webster University
Atiya Harmon (PSU 2002)   M.S., University of Pennsylvania
Dennis Harney (PSU 1993)   M.A., University of Pennsylvania
Janet Harris (PSU 1996)   M.Ed, Duquesne University
Meng He (PSU 2002)   M.S., American University
Paula Henderson (PSU 2005)   M.S., Barry University
Angela Hess (PSU 1998)   Ph.D., University of Iowa
Jeffrey Himes (PSU 1997)   M.A., West Virginia University
Priscilla Hockin-Brown (PSU 1996)   M.S., Michigan State University
Dustin Holloway (PSU 2002)   Ph.D., Boston University
Alisa Howze (PSU 1994)   Ph.D., Texas A&M University
Juliet Iwelumor (PSU 2006)   Ph.D., Penn State University
Andrea Jones (VSU 1998)   M.A., Virginia State University
Michelle Jones-London (PSU 1996)   Ph.D., Penn State University
Irene Karedis (PSU 2006)   M.A., Institute of World Politics
Leshawn Kee (VSU 1998)   M.A., Regents University
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                                     Ph.D., University of California-Berkeley

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Debra Marks (VSU 1996)   M.S., University of Virginia
                                     M.B.A., Liberty University
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Robert Miller (PSU 1999)   Ph.D., University of Kentucky
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                                     Ph.D., University of Michigan
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Julio Ortiz (PSU 2002)   Ph.D., Penn State University
Robert Osmanski (PSU 1995)   M.S., Penn State University
Hui Ou (PSU 2005)   M.S., Cornell University
Mark Palumbo (PSU 2000)   M.S., Wright State University
                                     Ph.D., Wright State University
Tracie Parker (VSU 2003)   M.A., Ohio State University
Anjana Patel (PSU 2008)   M.P.H., Drexel University
Franche Pierre-Robinson (VSU 2002)   M.Ed., University of Illinois-Chicago

Tiffany Polanco Katz (PSU 2004)	Ph.D., Rutgers University
Kenya Ramey (VSU 2006)	M.A., Temple University
Natalie Ragland (PSU 2001)	V.M.D., Ross University
Kristin Rauch (PSU 2004)	M.S., Ph.D., University of California-Davis
Cavin Robinson (PSU 2002)	M.A., Ph.D., DePaul University
Caryn Rodgers (PSU 2000)	Ph.D., St. John's University
Sassy Ross (PSU 2001)	M.F.A., New York University
Armando Saliba (PSU 2003)	M.A., University of Incarnate Word
Lilliam Santiago-Quinones (PSU 1998)	M.Ed., Bowling Green State University
Adriana Segura (PSU 2006)	M.D., Northwestern University
Thomas Shields (PSU 1998)	M.A., Penn State University
Christie Sidora (PSU 2000)	M.A., Duquesne University
Andrew Snauffer (PSU 1996)	M.S., Michigan Technical University
Melik Spain (VSU 1996)	M.S., Virginia Tech University
Anthony Spencer (PSU 1999)	Ph.D., Northwestern University
Kashra Taliaferro (PSU 2003)	M.Ed., University of Maryland-College Park
Scott Test (PSU 2008)	M.L.A., Clarion University
Constance Thompson (VSU 1996)	M.S., Cornell University
Steven Thompson (PSU 1997)	M.S., Indiana University-Purdue Ph.D., Clemson University
Anthony Paul Trace (PSU 2004)	M.S., Ph.D., University of Virginia
Shawyntee Vertilus (PSU 1998)	M.P.H./M.D., New York Medical College
Joshua Walker (PSU 2007)	M.Ed., American University
Katherine Wheatle (PSU 2008)	M.P.H., Emory University
Patrice White (VSU 2001)	M.A., University of Maryland-College Park
Kahlil Williams (PSU 2001)	M.A., Ph.D., University of Pennsylvania J.D., Columbia University
Romon Williams (VSU 1995)	M.S., Wake Forest University
Wendy Williamson (PSU 1995)	M.B.A., Penn State University
Michele Wisniewski (PSU 2004)	Pharm.D., Massachusetts College of Pharmacy
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Angel Miles (PSU 2003)	M.A., University of Maryland-College Park, now pursuing Ph.D. at same institution
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Zakia Posey (PSU 1999)	M.S., Michigan State University, now pursuing Ph.D. at same institution

At the undergraduate level…

Rafiat Adebowale (PSU) May 2011
Lance Boyer (PSU) May 2011
James Feaga (PSU) May 2011
Arlana Henry (PSU) May 2011
Alexa Hodge (PSU) May 2011
Quortne Hutchings (PSU) May 2011
Nile Koebler (PSU) May 2011
Esteban Luna (PSU) May 2011
Rafiqah Mustafaa (PSU) May 2011
Arielle Riutort (PSU) May 2011
Nicole Shelton (PSU) May 2011
Brian Walker (PSU) May 2011

On to graduate school in Fall 2011…

Lance Boyer now pursuing post-baccalaureate studies in Physics at the Perimeter Institute for Physics
James Feaga now pursuing graduate studies in Wildlife, Fisheries and Aquaculture Sciences at Mississippi State University
Arlana Henry now pursuing graduate studies in Sociology at University of Georgia
Alexa Hodge now pursuing graduate studies in Mental Health Counseling in Schools and Communities at Penn State University
Quortne Hutchings now pursuing graduate studies in Educational Leadership Studies at University of Illinois-Urbana Champaign
Nile Koebler now pursuing graduate studies in Mechanical Engineering at Cornell University
Esteban Luna now pursuing graduate and medical studies at University of Pennsylvania
Rafiqah Mustafaa now pursuing graduate studies in Educational Leadership Studies at University of Illinois-Urbana-Champaign
Arielle Riutort now pursuing graduate studies in Counseling Psychology at University of Akron
Brian Walker now pursuing graduate studies in Industrial/Organizational Psychology at Hofstra University

In graduate school as of Fall 2011…

Ilyas Abukar (PSU 2011)	University of Maryland-College Park (American Studies)
Diana Barrantes Gomez (PSU 2011)	Johns Hopkins University (Biomedical Sciences)
Shanya Cordis (PSU 2010)	University of Texas-Austin (Anthropology)
Latoya Currie (VSU 1999)	Virginia Commonwealth University (Education)
Alana Curry (VSU 2007)	Tuskegee University (Veterinary Medicine)
Keresha Deanes (PSU 2010)	Walden University
Mohamed (Faacy) Farook (PSU 2006)	Johns Hopkins University (Engineering)
Marlena Freeman (PSU 2010)	University of Georgia (Food Sciences)
Dawn Gannon (PSU 2010)	University of Baltimore (Creative Writing)
Blake Garcia (PSU 2009)	Texas A&M-College Station (Political Science)
Tatiana Gochez-Kerr (PSU 2010)	University of Illinois-Urbana-Champaign (Sociology)

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Lissette Herrera (PSU 2009)	LaSalle University (Psychology)
Victoria Jackson (PSU 2009)	University of Texas-Austin (Political Science)
Janay Jeter (PSU 2011)	Drexel University (Public Health)
Lauren Kessler (PSU 2008)	University of Pittsburgh (Psychology)
Renee Killins (PSU 2007)	Purdue University (Life Sciences)
Andrae Laws (PSU 2007)	Harvard University (Clinical Psychology)
Justin Meyer (PSU 2010)	Texas A&M University (Clinical Psychology)
LaShauna Myers (PSU 2003)	University of Pennsylvania (Higher Education)
Genevieve Miller Brown (PSU 2010)	Columbia University (Bioengineering)
Milton Newberry (PSU 2007)	University of Georgia (Wildlife Sciences)
Fawn Patchell (PSU 2007)	Penn State University (Nutrition Sciences)
McKenna Philpot-Bowden (VSU 2004)	St. Joseph's University (Education)
Sue Annie Rodriguez (PSU 2008)	Arizona State University (Human Development & Family Studies
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Aimy Wissa (PSU 2008)	University of Maryland-College Park (Aerospace Engineering)
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At the Essence of Health: Health Messages Portrayed to Black Women in *Essence* Magazine

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Introduction
Statement of the Problem

This study examines the public health messages contained in *Essence* magazine over 10 years (2001-2010). *Essence* is a print magazine that touches on health and relationships; personal finance and careers; arts and entertainment; world news; food; fitness; fashion; and beauty, as well as the personal challenges and achievements of African American women (Essence magazine, 2011). In terms of health, the top five causes of death in African American women in 2006 were heart disease, cancer, stroke, diabetes and kidney disease (Centers for Disease Control, 2010). As a culture that is constantly changing both socially and medically, the media is becoming a principal source of health-related information for African Americans. In a study of African American women, the majority of women listed mass media as a crucial source of information regarding breast cancer and diabetes, as opposed to physician opinion, and print media was utilized three times more frequently than electronic media (Sadler, 2005). Because of Black women's dependence on media information and the importance of health-related messages in magazines, the trends in health messages targeting Black women from 2001-2010 within a popular media source noteworthy.

Literature Review

Prevention is a key process in every walk of life and across every group of people. Particularly important is the health of Black women and the rate of progression that this group has experienced in terms of health over the years. Three particular levels of prevention are utilized during the process. The first is primary prevention, which is used before a person develops a disease. Its primary endeavor is to prevent the disease from developing. As a result of primary prevention, incidence and prevalence are often reduced. The next level is secondary prevention, which is used after the disease has settled in but goes unnoticed in the eyes of the patient. The objective of secondary prevention is to find and treat the disease early. The last level

is tertiary prevention, which targets patients who already have a disease. The goals of tertiary prevention are to: prevent damage and pain from the disease, slow the progress of a disease, prevent a disease from causing other problems, provide better care to people with the disease, and make people with the disease healthy again and able to do what they used to do (Centers for Disease Control, 2004).

When applied to Black women's health and their rates of morbidity, primary levels of prevention are essential in lowering the incidence rates of this group. However, because level of care varies from person to person, primary and sometimes secondary levels of prevention are often not utilized and fall short of what is needed in this population.

Print media such as magazines often are a primary source of health information for men and women of different backgrounds. Often, a message is relayed too quickly and interpretations diverge across various means of communication. With that said, the exploration of health messages across magazine genres can create an array of health information that can vary from one extreme to the next. In order to explore this topic in depth, this literature review will provide an overview of what various studies report about magazine messages for both men and women, the factors that influence articles, and the methods that can be used to better relay those messages to readers.

One of the most vital pieces to a magazine is the cover, and within the cover is a message that the magazine is attempting to communicate. However, drastic differences in conveyances occur between both men's and women's magazines. A study focused particularly on gendered messages in 21 popular men's and women's magazines discovered that 78% of women's magazines contained messages in regard to bodily appearance, whereas none of the men's magazines grazed the subject. Out of the women's magazines covers, 25% mentioned articles with contradictory messages on dietary habits and weight loss (Courtney & Lockeretz, 1971). Men's magazines generally focused more on providing entertainment and improving quality of life via activities, hobbies, and knowledge (Courtney & Lockeretz, 1971). Because of this divide consequences found in society likely revolve around gender norms and expectations, which ultimately lead to stereotyping (Malkin, Wornian, & Chrisler, 1999) ; (Courtney & Lockeretz, 1971). Often, magazines force women into particular roles that are/were traditionally used in the U.S. For example, women tend to work more in domestic positions than outside of the home. Also, a woman is "happier" when completing household tasks and serving as the caretaker of the family (Courtney & Lockeretz, 1971).

More specifically, African American magazines have created an even greater divide with stereotypes and messages throughout the years. Predominantly African American magazines tend to gravitate more toward the trends of White culture in America. The body type that has progressively grown more desirable in White culture has become thinner throughout the decades, which has ultimately influenced many minority cultures. In *Playboy* magazine, the evidence is even more apparent in seeing the changes of body type over the course of its history. Alongside *Playboy*, the same trends can be found in magazines such as *Vogue* and *Cosmopolitan*. That particular research is important to fully comprehend the meaning behind body esteem (Dawson-Andoh, Gray, Soto, & Parker, 2010). African American women in general feel very positive about their bodies and demonstrate overall greater confidence (Dr. Jennifer Graham, BBH 310-Spring 2010).

Inside these magazines, a continuation of the journey of health is explored in more detail. Women's magazines, in general, contain food advertisements no matter what the target audience may be. The reason being is that food is essential to human beings and is commonly used as a means of sociability, kindness, and warmth (Madden & Chamberlain, 2004). Food advertisements also blend into the expectation of women as primary chefs of households (Courtney & Lockeretz, 1971). However, many magazines tend to create a moral discourse in dietary practices related to guilt. Advertisements and articles gravitate toward the consequences of self-indulgence which can ultimately become problematic. Overall, the issue boils down to the morality of eating healthy and creating a balanced diet for the body. In women's magazines those roadblocks become more evident and burdensome by allowing the reader to question the ethical values in perilous dieting habits.

Due to the power of social marketing and thus mass media, relevant sources need to relay the proper information to their target audiences. As related to African American women, a study on African American magazines found that Black faces were depicted more in negative health-related ads. In mainstream magazines, White faces were rarely depicted in positive health-related advertisements (Sadler, 2005).

<u>Theoretical Framework</u>

The current study employs two guiding theories. First, the health belief model describes personal factors that attribute to a person's likelihood of changing behavior. Second, the prevention marketing model describes how behavior change can occur through media sources.

Health Belief Model

The health belief model consists of six concepts that are described in Table I.

Table I

Concept	Definition	Application
Perceived Susceptibility	One's opinion of chances of contracting a condition.	Define population(s) at risk; risk levels; personalize risk based on a person's features or behavior; heighten perceived susceptibility if too low.
Perceived Severity	One's opinion of how serious a condition is and its consequences.	Specify consequences of the risk and the condition.
Perceived Benefits	One's belief in the efficacy of the advised action to reduce risk or seriousness of impact.	Define action to take; how, where, when; clarify the positive effects to be expected.
Perceived Barriers	One's opinion of the tangible and psychological costs of the advised action.	Identify and reduce barriers through reassurance, incentives, assistance.
Cues to	Strategies to activate	Provide how-to information, promote

Action	"readiness."	awareness, reminders.
Self-Efficacy	Confidence in one's ability to take action	Provide training, guidance in performing action.

Table from "Theory at a Glance: A Guide for Health Promotion Practice" (1997)

In this study, we work under the premise that print media messages may bring to attention perceived risk and benefits, and may encourage Black women to contemplate perceived barriers, and may provide ideas about cues to action.

Prevention Marketing Model

Prevention marketing is an example of a theoretical framework that incorporates a multilevel approach in working with community-based, health-related behaviors. Originally developed in response to the epidemic of American youth contracting the HIV virus, The Centers for Disease Control adopted prevention marketing in 1993 (Lao & Brookmeyer, 1995). The Centers for Disease Control (CDC) is the federal agency responsible for disease prevention and health promotion in the United States. For lack of a more appropriate theoretical framework, the CDC created the overall framework coined prevention marketing. It laid the foundation for national prevention communication activities and demonstrations projects at the time (Ogden et al., 1996).

Within the design of prevention marketing are varying principles derived from three different disciplines that specifically target levels of health influences. Behavioral science, social marketing and community development are the three facets that comprise social marketing, and ultimately affect a target audience. Those three fields have historically been applied to public health issues over time, including that of magazine articles and advertisements. Behavioral science is a term that is utilized when describing analyses of multiple disciplines, which include but are not limited to psychology, sociology, and anthropology. Typical questions revolved around who is doing what, with whom, where, when, how, and how often. Social marketing involves the incorporation of commercial marketing principles and techniques in the process of attaining goals that are socially advantageous. In *Essence,* articles and advertisements frequently revolve around current trends in food, health, employment, etc. that render socially advantageous for its readers. Its process consists of a multistage strategic planning and implementation process that characteristically has five steps. Lastly, community development encompasses interventions at the community level that impact community-based organizations and work to resolve community problems. Being a Black woman's magazine, a sense of community is a large benefactor in producing the magazine as a resource for women of color (Kennedy & Crosby, 2002).

Print magazines are often a means for consumers and patients to explore all three realms of the prevention marketing model. In behavioral science, studies printed in journals and magazines offer insight on the latest studies and potential changes in regulations, pharmaceuticals, and treatments. Social marketing is perhaps the most popular in terms of print magazines because of its social aims and goals. With print magazines overall, social marketing is the most widely used (Kennedy & Crosby, 2002). Lastly, community action advertisements and promotions are predominantly used in magazines to promote secondary and additional information on certain subjects.

The Health Belief Model and Prevention Marketing Model will both be used in the analysis of *Essence* magazine health articles from 2000-2001. More specifically, the Health Belief Model will be used to extract information in each article by determining what levels of the model each article addresses. The levels will be recorded in an overall extraction form to compare the various articles throughout the years. The elements of Prevention Marketing Model will also be used in the extraction form to determine which of the three elements each article addresses. However, in some cases, articles may target more than one element of the Prevention Marketing Model.

With the data extracted from the models applied to each of the theories, an overall comparison can be established as related to where Essence magazine is lacking and where its strong suits are in messages to Black women.

Methodology

Data and materials:

Essence magazine was first published in 1970 exclusively for African American women. With its slogan being "Where Black Women Come First," the magazine focuses on news, entertainment, and motivational monthly pieces. It has become one the largest labels and magazines in the lives of African American women to the point of affecting its readers' lives personally, professionally, intellectually and spiritually. Since its inception, it has continued to expand upon topic areas in African American women's lives, including career and finance, health and lifestyle, and fashion and beauty; career and finance; health; and lifestyle. Originally starting with a readership of 50,000 in May of 1970, *Essence* now boasts a monthly circulation of 1,050,000 and a readership of 8.5 million (Essence Communications Inc. , 2011).

Data collection procedures:

Health message trends were studied by examining the MINDBODY and later HEALTH section of every *Essence* magazine between 2001-2010. The MINDBODY and HEALTH sections highlight various aspects of health within each month including sexual, physical, and mental health. In each month of *Essence* a MINDBODY section or HEALTH section was listed in the table of contents. Every article was categorized into different topics on the form: sexual health, physical health, aging, medicine, spiritual health, and mental health are the six categories. Extensive effort was made to retrieve every article. However, some issues did not included MINDBODY or HEALTH sections while other articles were not reproduced on the database website.

With each article examined, data was recorded on an extraction form created to interpret which data corresponded to the utilized models. Both the Health Belief Model and the Preventative Marketing Model were used to categorize what levels of each were addressed in the articles. In addition, the level of prevention was indicated in order to determine around which prevention level the article revolved.

Elements of Extraction:

1) Year/Month: Every magazine from 2001-2010 was utilized for data interpretation. The year and month were tracked in order to compare the differences in the objectives from month to month and throughout the decade.

2) Title: The title of each article was recorded in the extraction form to distinguish among the articles of each month.

3) Category: Every article was categorized into one of six categories in regard to its overall messages: sexual health (SH), physical health (PH), aging (A), medicine (M), spiritual health (SPH), and mental health (MH).

4) Author: The author(s) of each article was/were noted to determine if there were particular patterns existed in writing.

5) Level of Prevention: With each *Essence* article, the level of prevention (LOP) was used to identify what particular audiences were targeted. The primary, secondary and tertiary levels of prevention are used to determine disease prevention (Center for Disease Control, 2004).

6) Health Belief Model: The Health Belief Model (HBM) was used for every article in determining how it addressed perceive susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and/or self-efficacy.

7) Prevention Marketing Approach: The Prevention Marketing Approach (PMA) identified if one or more of the three elements of the approach were embedded in each article's objective. The three elements include behavioral marketing, social science, and community development.

With all of the data formed together, the patterns of health messages will be tracked over the 10-year period.

Analytic Approach:

Content analysis will be employed to identify types of health messages, the level of prevention, and the message's relation to potential behavior change. Additionally, I will assess the frequency of each category of health message and whether the message addresses the top 10 causes of morbidity and mortality among black women according to Healthy People 2010.

Results

In order to analyze the research content, I analyzed each of the magazine's articles from 2001-2010 by applying the Prevention Marketing Model, Health Belief Model and goals of Healthy People 2010 to content of all 408 articles. Table 2 below lists the title of each section to which the articles belong and the changes over time.

Table II

Month/Year Beginning	Month/Year End	Title of Section
January 2001	April 2003	MINDBODY
May 2003	September 2005	HEALTH
October 2005	May 2008	BODY&SOUL
June 2008	March 2009	Healthy Living
April 2009	December 2010	BODY&SPIRIT

Each of the sections contained articles pertaining to health in various forms. However, some study articles that focused on specific questions or personal issues that could not be categorized accordingly were excluded. Between the years 2001 and 2004, the "Between Us" and "Ask Iyanla" articles were excluded as a result of their content. In addition, the "How She Does It" articles from years 2009-2010 were excluded as a result of their content as well. Extensive efforts were also made to obtain every article needed from the 10-year time frame. Some magazines did not contain the sections desired and some articles were decipherable for extraction.
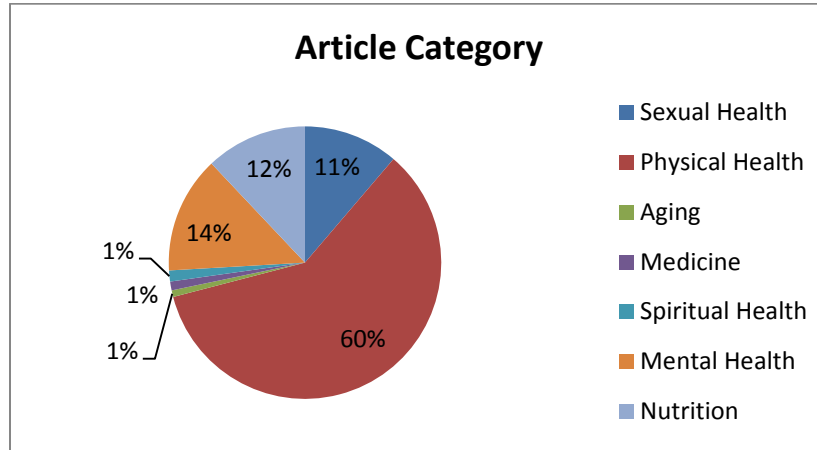
Categorization

Each article extracted was categorized into one of seven categories based off of its messages: sexual health, physical health, mental health, spiritual health, mental health, nutrition, and aging. Each of the categorizations contained their own core messages. A sample is listed below:

1. Sexual health- Sexual health and happiness is a shared concern among the Black female community. Questions that often cause embarrassment should be addressed monthly. In January of 2006, the article titled "Your sex life" focused on sex toys and achieving an orgasm with you partner.
2. Physical health- Exercise in various forms on a daily basis is important to Black women's everyday health.
3. Mental Health- Many warning signs of mental illnesses and struggles often go unrecognized in the Black community.
4. Nutrition- Quick and healthy meals can be very useful with hectic schedules. Learning how to prepare well-balanced meals is a also a means of preventing certain diseases. In July of 2003, the article titled "What you see is what you eat" provided healthy recipes and tips for weight loss via daily eating habits.

The majority of the articles (60%) addressed issues concerning physical health. Each magazine from 2002-2010 typically started each health section with an article on physical fitness and specific exercises to improve a woman's physique. However, many articles addressed risks of diseases, methods of prevention, and awareness related to Black women's physical health. Obesity steadily became an even more common article topic toward the later portion of the decade, with articles specifically aimed at overweight women of color.

Sexual health and nutrition became of growing popularity as the health sections expanded over time. In 2009, nearly every magazine contained "Sexual Health" and "Healthy Food Fast" sections. The focus of the "Sexual Health" section was generally to promote awareness of sexual health issues related to Black women such as HIV, fibroids, and contraception. The "Healthy Food Fast" section provided quick and healthy recipes for Black women on-the- go, as well as relative information on how food shapes our overall health. Figure I breaks down the percentage frequency of each category.

Figure I

Article Category

- Sexual Health — 11%
- Physical Health — 60%
- Aging — 1%
- Medicine — 1%
- Spiritual Health — 1%
- Mental Health — 14%
- Nutrition — 12%

Levels of Prevention

The level of prevention was used in the extraction form to determine what level each article addressed, be it primary, secondary, or tertiary. More than half of the articles addressed primary levels of prevention, meaning before a disease or condition has set in and providing guidance in preventing onset. An example of an article that addresses all three levels of prevention is "Triple Threat" from the October 2008 issue of Essence. The article touches on the stages of breast cancer and what Black women need to know in order to take action. Figure II depicts the percentage breakdown of prevention level focuses.

Figure II

Levels of Prevention

- Primary Prevention — 57%
- Secondary Prevention — 25%
- Tertiary Prevention — 18%
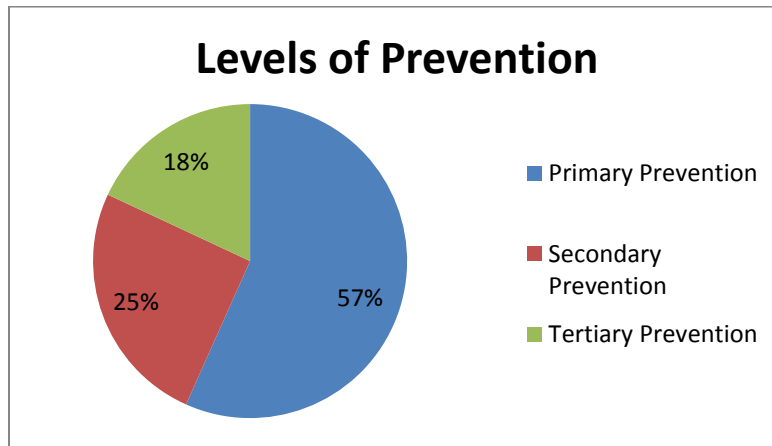
Health Belief Model

   Each of the six elements of the Health Belief Model was applied to the magazine articles. Many articles contained more than one element, while others possessed only one. Perceived susceptibility articles addressed not only Black women, but Black women who fit the articles target audience; for example, topics such as stress, HPV, and cancer were addressed. Perceived severity articles addressed consequences and risks associated with the topic of concern. Perceived benefits, Cues to Action and Self-Efficacy articles typically were grouped in providing the reader with direction and clarity. Perceived barriers concentrated on reassurance and guidance in order to keep the reader from straying away from the topic or information. Figure III breaks down the percentage of articles utilizing the elements of the Health Belief Model.

Figure III
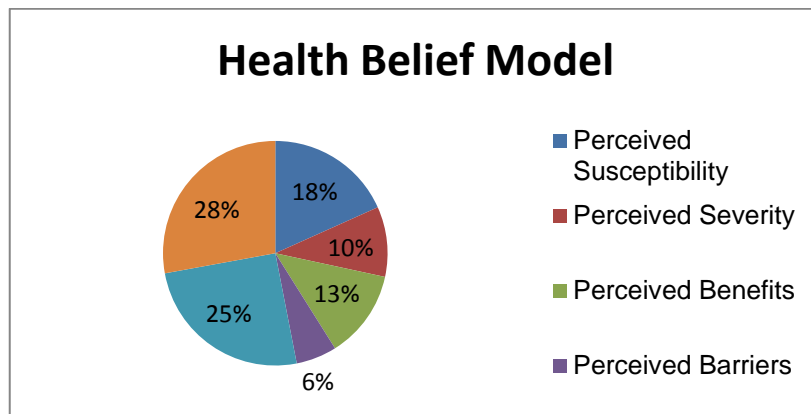
Prevention Marketing Model

   The most frequently utilized element of the prevention marketing model was Social Marketing. Being that the magazine is utilized for informational and educational purposes rather than research, no articles addressed Behavioral Sciences. Within some articles and coupled with Social Marketing, were Community Action measures. However, 15 articles out of the 408 concerned Community Action. Figure IV breaks down the percentage of articles related to the prevention marketing model.

Figure IV
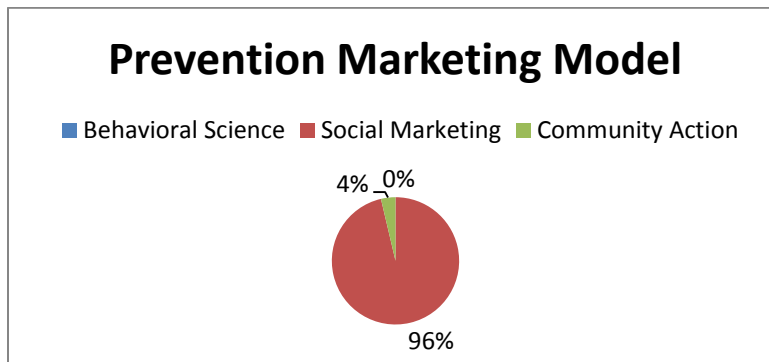
Healthy People 2010

The two goals of Healthy People 2010 are as follows:

1. The first goal of *Healthy People 2010 is to help individuals of all* ages to increase life expectancy and improve quality of life.
2. The second goal of *Healthy People 2010 is to help the U.S.* eliminate health disparities among different segments of the population.

It is also noteworthy that all of the articles as a whole work to achieve these two goals. By demonstration of the effectiveness of the two models, each health section clearly works to increase life expectancy, improve quality of life and eliminate health disparities specifically concerning Black women. Disparities included in *Essence* from 2001-2010 included obesity, HIV, and cancer.

Discussion

The study on health messages in *Essence* magazine from 2001-2010 provided a succinct pattern of information related to Black women's health. The purpose of the study was achieved through examining over 400 health articles from the magazine over a 10-year time period. Focuses on weight loss and nutrition became heavily documented toward the latter half of the decade. Sexual health was also a popular topic, but *Essence* did lack in the areas of HIV/AIDS and breast cancer specifically.

To my knowledge, previous studies have examined messages in a variety of magazines in terms of body image, health, and advertisements. Most popular to those studies are magazines and advertisements that target predominantly White audiences. However, with *Essence* magazine, a story was created that shaped the health of Black women over the course of 10 years. One of the most popular stories was that of nutrition and its importance to overall health. Madden and Chamberlain (2004) pointed out the essentiality of food to humans. Essence magazine took that concept to the next level and provided ways for women with fast-paced lives to continue their health dietary habits. By providing "5-minute recipes" for women on-the-go, the magazine's highlights opened doors for a wide range of nutritional educational strategies and essentially, weight management. In terms of nutritional competence, Courtney and Lockeretz (1971) examined the moral guilt of not eating healthy and the effects that it has on women's food habits related to binge dieting, eating disorders and weight loss. Contrary to popular research, *Essence* capitalized on the Self-Efficacy and Cues to Action constructs of the Health Belief Model by empowering Black women in their eating habits and restoring their confidence within themselves.

Throughout the course of the 10 years, health messages increased in importance, popularity, and diversity as whole. Beginning with the MINDBODY section in 2001, relationships and issues involving sex were of significant importance to the magazine in general. Steadily, weight and nutrition began to take control of the health sections and quickly became routine monthly topics. Coinciding with the obesity epidemic in America, specific weight loss and healthy cooking grew into common articles for *Essence.* Yet, of significant concern to the Black female community are breast cancer and HIV. Since reducing the risk of obesity thus decreases the risk of breast cancer, few articles focused on and specifically highlighted breast cancer in black women. As a population dying more frequently from the disease than any other group, that is of utmost concern and importance for *Essence* editors to consider when addressing

health issues over the next decade. In addition, HIV/AIDS was addressed but was often mixed in with related sexual health articles. Since Black women suffer from HIV/AIDS more often than any other group should be grounds for extensive article awareness with regards to all three levels of prevention (Centers for Disease Control, 2010).

The health messages in *Essence* provided Black women with a sense of responsibility and promoted pride in their health. The magazine as a whole aimed to heighten the self-esteem of Black women my providing resources to improve their lives. By allowing primary prevention to be so prevalent in its health articles, *Essence* provided preventative measures for the betterment of the Black community as a whole.

Limitations

One of the most significant limitations of the study involved the target audience of *Essence*. As a whole, the magazine caters more toward women of middle and upper class. Frequently, articles or prevention methods may not be as accessible to Black women of lower class. In addition, many Black women may not use *Essence* magazine or magazines a primary source of health information.

Secondly, with increasing importance to the technological society, *Essence* could potentially be on the decline as a primary source of health information in comparison to the Internet and other electronic media. As more minorities are becoming adept and have access to electronic sources, many may not want to spend the money on a magazine but rather look up health information of significant concern.

Future Research

For future research, it is vital that *Essence* needs to account for the top 10 causes of death associated with Black women in America. In doing so, a more solid framework of health messages can be accounted for in each issue. Also, each needs to stick to receiving the proper health information from professionals in the field who are up-to-date with trends of public health in the United States.

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The American Paradox
Discovering America in Carlos Bulosan's *America is in the Heart*

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Abstract

This essay examines the definition and various roles of the United States and its inhabitants in Carlos Bulosan's semi-autobiographical *America is in the Heart*, a classic work of Asian American literature. The myriad of American characters in the novel reveal a vast diversity in the American population. *America is in the Heart* charts the paradox of the United States in the first half of the 20th century; while there are Americans who do not succumb to the common racism of the day—there are, in fact, those who rebel against it—the grand majority of the protagonist's experiences with Americans, particularly those of the upper classes and those in law enforcement, project the darker aspects of their own desires and society on the 'Other'; some label minorities as sex-crazed deviants while simultaneously displaying a subconscious obsession with sexuality, others accuse minorities of infesting the nation with crime while consciously and unabashedly stealing from them. But despite the protagonist's seemingly constant contact with prejudice, he is also met with kindness from Americans throughout his travels and has reason to believe that this is a nation where equality is possible, even if it was not practiced. The conflicting nature of Americans throughout the novel reveals a degree of uncertainty, from both Americans and foreigners, as to what the word "American" actually means.

Introduction

Carlos Bulosan's *America is in the Heart* is deservedly well remembered for its insight on the immigrant experience within the United States. But if Bulosan's audience focuses purely on this facet of Bulosan's work, though it is certainly extremely significant, they risk doing themselves a great disservice. Bulosan's *America is in the Heart*, in addition to shining light on the Filipino-American lifestyle in the first half of the 20th century, also shines light on the United States itself. *America is in the Heart*, which leans heavily on Bulosan's own personal experiences within the United States, provides readers with a snapshot of the United States from a perspective not usually explored when attempting to define the word "America": the perspective of an American immigrant.

America is in the Heart, Bulosan's best remembered work, is a semiautobiographical novel with especially strong ties to Bulosan's own experiences—these ties are so strong that the novel is occasionally referred to as an autobiography. Bulosan himself was born sometime between 1911 and 1913 in Binalonan, a Filipino city on the island of Luzon, to a working class farming family. He spent his childhood doing manual labor in the Philippines until his late teenaged years, when he decided to leave the Philippines for the United States. He arrived in Seattle, Washington in 1930 and would never return to his homeland. Upon arriving in the United States Bulosan resumed the life of a poor laborer; he worked several odd jobs under the stress of poverty and discrimination until the fatigue and stress of a migrant and difficult life wore him down physically and he found himself in the hospital with tuberculosis. During his three year tenure in the Los Angeles County Sanitarium Bulosan had the opportunity to delve into the world of American literature; he claimed to have read a book a day for at least the grand majority of his stay, and he certainly took advantage of his newfound time to evolve intellectually. After being released from the hospital Bulosan went on to become a social presence on behalf of working class immigrants on the West Coast; he spoke out on behalf of unions and was blacklisted by the FBI for socialist leanings. He also discovered a penchant for creative writing and would become an accomplished poet, novelist, and essayist. He died in Seattle in 1956 due to advanced lung disease and is now celebrated for giving a post-colonial outlook on Asian-American involvement in the labor movement of the early 20th century.

The plot of *America is in the Heart* parallels its author's personal experiences. The protagonist, who is also named Carlos (though he goes by the nickname 'Allos' when in the Philippines and tells others to call him 'Carl' while in the United States) is a young boy working with his father on their farm in the Philippines at the book's opening. After a period of working throughout the island of Luzon Carlos immigrates to the United States, where he continues to work as a migrant laborer until he realizes he is capable of writing in English and pledges to bring his family members back to life through the written word. He also often uses literature to connect with the United States itself; Carlos reads classic American authors like Whitman and Melville in an attempt to discover and understand a side of the United States far removed from the prejudice and pain of the American society he found himself in.

On one occasion Carlos and some acquaintances were attacked by a group of white men for no reason other than their race, only to be greatly aided by the white men and women working in a hospital.

> Walking down the marble stairway of the hospital, I began to wonder at the paradox of America. José's tragedy was brought about by railroad detectives, yet he had done no harm of any consequence to the company. On the highway, again, motorists had refused to take a dying man. And yet in this hospital, among white people-- Americans like those who had denied us-- we had found refuge and tolerance. Why was America so kind and yet so cruel? Was there no way to simplifying things in this continent so that suffering would be minimized? Was there no common denominator on which we could all meet? I was angry and confused, and wondered if I would ever understand this paradox. (Bulosan 147)

The word "paradox" perfectly summarizes Carlos' experiences in the United States. Like Carlos searched for America through the works of great American authors, the reader can look through Bulosan's work and glimpse at an early 20th century America in conflict with itself. The

United States, which had just entered the long years of the Great Depression when Carlos arrives in Seattle, is revealed in the novel as consisting of two very different halves, and Carlos is constantly vexed by the inconsistent nature of the United States. In America Carlos experiences both great kindnesses and great cruelties, often within the same moment, and this strange combination often drives Carlos to tears. He experiences no shortage of prejudice in the United States, and the results of these prejudices range from verbal slights to severe physical and sexual abuse. Yet despite the many hardships and prejudices Carlos faces, he comes to think of America in a very positive light—the kindnesses he benefits from in the United States combine with a more intangible sense of hope in the potential of America. Within Bulosan's work the reader finds tropes that should sound familiar to anyone who has taken elementary school American history classes; there is assurance and a faint tint of pride in the possibilities of America; by the end of the novel Carlos has faith that this is a nation where great things can and do happen, and he ends the novel by stating that nothing will ever take this faith from him again.

By recognizing the two halves of this paradox and forgiving the United States for its ruthlessly conflicting nature, Bulosan shows a growth in the understandings he comes to with his various inconsistent childhood and adult perceptions of America. His ability to not only make these understandings but allow them to evolve throughout his time in the United States makes Bulosan a credible and fascinating source of information on the America that he lived within and further complicates the already tangled and wide-ranging opinions of what the word "American" should mean at all. By allowing his audience to peek into his experiences through his protagonist and namesake, Carlos Bulosan shows how America both defines and is defined by the masses who venture onto its shore in an attempt to find the lives they were meant to live.

The First Half of the Paradox: American Brutality and Patriotic Brutes

The United States that Carlos Bulosan describes in his novel is unquestionably a brutal world for immigrants to inhabit, and almost every facet of an immigrant's lived is tinted with a shade of violence. The vast majority of this violence is rooted in racism. Throughout the novel Carlos has a myriad of racist experiences in the United States, the first of which occurs before he so much as steps in the country—he is called a savage by a white American for the first time on the boat that first brings him to Seattle—and the novel ends with no hope of these occurrences ever coming to an end. The worst of these racist encounters were those that escalated into violence—and this, unfortunately, was not at all uncommon. Carlos finds himself physically abused by both civilians and law enforcement officers throughout his life in the United States, and one of these attacks left Carlos with a hurt knee that never recovers. The racist incidents in the novel tend to be brief and are not described with much detail. The racists in the novel often only appear in one quick scene and usually go nameless, only serving as an example of the frequency and popularity of this racist mindset.

The racism of the novel is often shown in conjunction with hypocrisy; many of the justifications for prejudice on the part of these racist white Americans are rooted in perceived flaws within the minorities that are palpable within American society. The most obvious of these is the complicated relationship between American racism and sexuality. In the novel Filipinos are often derided for being blatantly sexual beings—in Carlos' first encounter with racism on his voyage to the United States a teenage girl tells her companion to "look at those half-naked savages from the Philippines…! Haven't they any idea of decency?" (Bulosan 99). And yet the

Americans that Carlos encounters display a certain fascination with sexuality of their own. The teenage girl who derided Carlos was wearing a bathing suit that he describes as "brief" (Bulosan 99), and as a working child in Binalonan notes that the American tourists were only interesting in taking pictures of "young Igorot girls with large breasts and robust mountain men whose genitals were nearly exposed, their G-strings bulging large and alive" (Bulosan 67). Racism is used as a justification for attacking minorities, exploiting minorities, and allowing minorities to continue to live in squalid and unfair conditions, and when these presumptions are challenged the American racists react strongly; one affluent white man tells Carlos that "you," which is here used to collectively refer to all minorities suffering from the effects of gambling and opium rings, "brought this on yourself" and is infuriated when Carlos attempts to argue that many of these gambling rings are actually run by aristocratic white Americans in the area (Bulosan 163). The hypocrisy of many of the racist statements in the novel reflects a projection of subjects and habits that white Americans consider indecent or uncomfortable within society onto a vulnerable population of immigrants that cannot effectively defend themselves.

The America of *America is in the Heart* is not only brutal, it effectively brutalizes the majority of its inhabitants; it twists the initial outrage and disappointment of the downtrodden into something significantly nastier and more violent. Bulosan's works are so saturated with distinctive phrases and concepts that it seems curious to refer to a cliché. But when Alfredo justifies his new career as a pimp with the well-worn "Open your eyes, Carlos. This is a country of survival of the fittest" (Bulosan 170) he accurately summarizes the evolution of a mindset within many of the immigrant class. The tragedy of the immigrant in *America is in the Heart* is not merely embedded in the brutality of the United States; it is in the unquestionable ability of the United States to expose and nurture brutality in its inhabitants. It is a phenomenon perfectly personified in Max Smith, the small Filipino who Carlos encounters at the height of his own stint with brutality. Max Smith is particularly interesting for two reasons: first, he went by a purely American name, which Carlos acknowledges as strange, and second, he purposefully and purely maintains this brutality for his own safety: "Max pretended to be bold and fearless, but his bravado was a shield to protect himself, to keep the secret of his own cowardice" (Bulosan 164). Max's illusion of cruelty is a specific kind of reaction to his surroundings; he is not pushed to the point where he wishes to resort to violent means, but he perceives that these violent means are necessary for survival in the United States and has no moral concerns about maintaining a negative and stereotypical image.

But the reader is introduced to the concept of brutalization in the United States long before they are introduced to Max Smith; in fact, the novel introduces its reader to this brutalization before Carlos so much as sees the boat that would bring him to the United States and the rest of his life. Bulosan describes two Filipinos "bitter and confused" (Bulosan 83) by their experiences in the United States: his English teacher in the Philippines, an unabashed man who never quite managed to forgive fate for the death of his father during his fifteen year stint as a houseboy in the United States, and a peasant who had attended college in the United States and returned to lead the violent Colorum Party in several revolts throughout the Philippines. These two characters are noteworthy because they brought this bitterness back to the Philippines and their anger taints the actions they take towards fellow Filipinos—people who are in no way responsible for the treatment they received or the hardships they faced in the United States. This suggests that these two men are not merely driven by some need for revenge—if it was, one would imagine their anger (and, more importantly, the actions rooted in their anger) would be

directed at the American and European tourists that descend upon the Philippines throughout the first half of the book. Their personalities were very genuinely and very negatively affected by their times in America and their anger wound up channeled in their returns to the Philippines. Though it is only fair to note that, while both react to negative experiences in the United States after their return to the Philippines, the nature of these reactions are different. Regardless of how one feels about his methods, it is safe to assume that the leader of the Colorum party intends to channel his American experience into some good; the revolts are started with the intent to help the peasants of Luzon. The English teacher, on the other hand, does not take much action as a result of his experiences; while he, like the Colorum Party's leader, does tend to direct his bitterness towards the upper classes-- specifically the haciendros, or land-owning classes, of the Philippines—his most rebellious act recorded in the novel is giving Carlos the answers to a nation-wide test.

America's tendency to brutalize its inhabitants is not restricted to those who managed to return to their native country; Carlos documents the 'brutalization' of several of those close to him. Among the best documented of these brutalizations takes place within Carlos' brothers Macario and Amado, in whom Carlos notes several changes after they reunite in the United States. Carlos first notices Amado's "Americanization" in Amado's speaking patterns. After Amado's years in the United States, Carlos notices Amado's swifter, cleaner English and he also takes note of—and is often bothered by—his brother's calling him by his Christian name (Carlos) rather than the common nickname with which he is introduced to the reader (Allos). But Amado's changes run deeper than his improved grammar and diminishing Filipino accent. When they first reunite Amado does not recognize his younger brother and nearly stabs Carlos as a result. "I wanted to cry because my brother was no longer the person I had known in Binolan," Carlos reflects as he leaves Amado for Los Angeles shortly after their first American reunion. "He was no longer the gentle, hard-working janitor in the presidencia. I remembered the time when he had gone to Lingayen to cook for my brother Macario. Now he had changed, and I could not understand him anymore" (Bulosan 125-6). Carlos immediately recognizes a newfound aggression in Amado's personality, an aggression that unnerves Carlos so greatly that he nearly cries and asks God not to allow the same to happen to him.

Despite this prayer, Carlos too succumbs to this instinctive brutality when his frustration at the unfair circumstances that he can never seem to escape from in America is compounded by a personal tragedy (like his former English teacher, the news of the loss of a parent signifies the moment Carlos surrenders, however temporarily, his belief that one can live decently in the United States).

> I had tried to keep my faith in America, but now I could no longer. It was broken, trampled upon, driving me out into the dark nights with a gun in my hand. In the senseless days, in the tragic hours, I held tightly to the gun and stared at the world, hating it with all my power. And hating made me lonely, lonely for beauty and love, love that could resuscitate beauty and goodness… But I found only violence and hate, living in a corrupt corner of America. (Bulosan 164)

After the death of his father Carlos essentially agrees to live by the standards set for poor minorities in a racially prejudiced society. He does exactly what the racist characters of the novel would expect a Filipino immigrant to do: during this period Carlos repeatedly commits petty theft from whoever has the misfortune of being conveniently close by, he makes his living

almost exclusively through gambling and spends a significant fraction of his winnings on alcohol, and seriously plans with Max Smith to murder both a security guard and a bank owner en route to robbing the bank itself. The disturbing part of this period in Carlos' life is how he channeled his energy into this vicious and degraded mentality with such ease. The bank robbery was Carlos' brainchild, and he admits that the idea drove him "like a marijuana addict when it seized my imagination" (Bulosan 165), he tells Max Smith his idea with neither hesitation nor guilt, and his excitement over the idea inspires him so greatly that he "stopped to catch [his] breath, so great was the idea, so breathtaking and courageous!" (Bulosan 165). But while Max Smith turns to the illusion of brutality to protect himself, Carlos' brutalization is a shade deeper. Carlos considers the bank robbery to be more than a method of survival; he takes genuine pride in it, a far cry and disturbing opposite from earlier in the novel when Carlos considered defending a French-American employer and his family the only courageous thing to do and was deeply upset with Julio for pulling him away.

If America fosters a brutality in men, it grows a tendency for manipulation in women. There are several females in the novel who attempt to coerce a male into marriage, but Carlos never witnesses one of these ventures succeed until he reaches the United States, when LaBelle attempts to use her pregnancy to legally ensnare Conrado and instead is awarded the good-looking Paulo for her efforts. There are a few factors that could explain why LaBelle succeeded where a number of others had failed. In the Philippines every young man accosted by a female manages to escape by escaping to a different city, a feat that Conrado neither has the time nor the presence of mind to attempt. But some credit should go LaBelle herself, who planned her attack with much more foresight than any of her contemporaries in the Philippines, and certainly goes about it with a touch more bluntness and a cruelty of her own. When a girl in the Philippines tries to find a husband in Carlos, she approaches his mother and plays with his baby sister. LaBelle greets the man she hopes to marry by throwing water on his face and asking "Are you going to marry me or not?" (102). Rather than merely trying to talk her way into a marriage, LaBelle uses her newborn—a child that Carlos and all of his coworkers were positive was not fathered by any in the group-- and a company official to attempt to force her will on Conrado. LaBelle takes a law intended to protect her and twists it in her favor. The only female in the Philippines who comes close to this level of manipulation is Veronica, and her level of destruction in Carlos' life could very well have been accidental—the reader can assume that the landlady told Carlos to flee because Veronica had fingered Carlos as the father of her child, but is no proof in the novel strong enough to indict her. But LaBelle is not the only one who uses a cruel manipulation to her advantage. Helen makes a career of it by sabotaging worker's unions throughout the West Coast, justifying her actions with racism. There are more examples of racism in this account than one can count, but the vast majority of those examples are initiated by men. Of the women who actively expose themselves as racists, Helen is the only female in the novel to direct her racism into some ongoing and palpable action—her work with the company owners is based in her ability to lie her way into the inner circles of Unions and manipulate a targeted member to suit her means.

Helen and LaBelle both thrived by the manipulation of relationships, but they would not have been successful if relationships between the poorest of the United States not been so strained and desperate in nature. Many of the poorest in the novel react to the constant brutalities of life in the United States by banding together, but these bonds are clearly influenced and strained by their difficult life. While in the Philippines, Allos copes with his family's poverty in

part by relishing in the strong bonds he has with his family; he says of one night he spent speaking with his family and fellow villagers that "it was inspiring to sit with them, to listen to them talk of other times and other lands; and I knew that if there was one redeeming quality in our poverty, it was this boundless affinity for each other, this humanity that grew in each of us, as boundless as the green earth" (Bulosan 10). While life was difficult in the Philippines, there was also a sense of genuine goodwill and community, and Carlos often recalls moments of bonding with all but one of his brothers (the sole exemption being his eldest brother, who briefly reappeared in Carlos' life when he was young and who Carlos did not speak to again after that reencounter). Relationships in the United States, in contrast, tend to be rooted in something much more fraught. Carlos notices that his brother Amado's group of friends were bonded by a shared desperation; "what mattered to [Amado] was the pleasure he had with his friends. There was something urgent in their friendship, probably a defense against their environment. They created a wall around themselves in their little world, and what they did behind it was theirs alone. Their secrecy bordered on insanity" (Bulosan 170). Even the relationships Carlos had with his brothers suffered after their move to the United States. Carlos repeatedly regrets their refusal to acknowledge him by the nickname he was known by in the Philippines. In the Philippines, Allos' older brothers took on a nurturing role, often caring for him through various injuries and illnesses. In the United States this does not end completely—Macario does care for Carlos after Carlos is released from the hospital—but the stresses of difficult lives take a toll on their relationships. While all three brothers separate on a friendly note, they get into several conflicts of their own, the worst of which turning for the dangerously physical.

The Second Half of the Paradox: A Place Worth Hoping For

As easy as it is to wrap oneself entirely in the cruelties of the United States in *America is in the Heart*, Bulosan's America is much more than a collection of sorry and pitiless people committing sorry and pitiless crimes against one another. Bulosan reveals a side of America that inspired the phrase "land of the free". Arguably the most important facet of the positive side of the United States of Bulosan's novel is the people who make up the nation itself. While the novel certainly features more than a fair share of violent, brutal, and racist characters in America, it also portrays characters that, for whatever reason, avoid the brutalizing effect and racially based hierarchy of the United States. There are an array of minor characters who ignore the tradition of racial prejudice and treat Carlos with the same kindness they would treat any other American.

A significant portion of these minor characters are female. If we can divide the brutality of American women into two categories (those who restrict their brutality to dialogue and those who go a step further and those who channel that brutality into action) we can effectively do the same for the America women defined by kindness (those whose kindnesses are short-term and those whose kindnesses are long-term). The women of the former category only represent the most fleeting experiences in Carlos' life—most are not given a name, let alone a description longer than a few words. The longest of these spontaneous and transitory interactions is the two or so days Carlos spends with Lily and Rosaline in Oregon. The women who grant Carlos some short-term act of kindness are not contained into some easily defined group; they can be of any race or socio-economic background—Lily and Rosaline are both Caucasian-Americans who come from fairly comfortable backgrounds, but Carlos also recalls with gratitude a working class Korean immigrant who fed him on multiple occasions while he is trying to reunite with his

brothers and is stunned by the stark contrast of the cruelty of his multiple physical attackers with the warmth of the nurses who were charged with cleaning his wounds. This diversity is one of this group's great strengths; Carlos may be confronted with prejudice everywhere he turns, but he also trusts that he can find some grains of genuine goodwill, and he can occasionally rely on these fleeting kindnesses to provide great needs (for example, the Korean immigrant fed him during a period where Carlos could not afford food) in times of greater instability.

The women who provide long-term kindnesses to Carlos are both less numerous and less diverse. There are three women who assume the role of caretaker in Carlos' life—two, Marian and Eileen Odell, do so in the United States and the last, Miss Mary Strandon, in the Philippines. Marian, who Carlos stumbles upon just after he is physically assaulted and sexually abused by a group of white men, only lives to spend a short time with Carlos but makes her intentions clear almost immediately.

> I'll help you. I'll work for you. You will have no obligations. What I would like is to have someone to care for, and it should be you who are young. What matters is the affection, the relationship, between you and the object. Even a radio becomes almost human, and the voice that comes from it is something close to you, and then there grows a bond between you. For a long time now I've wanted to care for someone. And you are the one. Please don't make me unhappy. (Bulosan 212).

Here Marian reveals that native-born Americans are not exempt from the loneliness that haunts Carlos during his darkest days in the United States, she admits to needing an object for her care so badly that even an inanimate object can be bonded with when no other options are available. But, rather than allow the loneliness to dominate her psyche, Marian recognizes her desire and uses it to justify a positive action—she forms a relatively healthy (if entirely spontaneous) connection in a society and class system where connections tend to parallel the desperate clinging relationship of Amado's group of roommates. Where Amado and his friends attach to one another as a means of survival, because they need one another in their lives, Marian attaches herself to Carlos simply because she wants another person in her life. This difference reveals America as capable of forming relationships based on nothing more than a series of positives: the desire to do good, the human need for companionship, a mutual trust that bypasses race and economic background.

Eileen Odell is noteworthy because of both the length of her association with Carlos— their friendship spanned several years and is among the longest of Carlos' non-familial relationships—and the less particularly comfortable nature it assumed. Of the three American "caretakers" in Carlos' life, Eileen was the only one who could be called a friend; she cries at his bedside while he was in the hospital suffering from tuberculosis and engages him in conversations about the literary world he is discovering through his three year span in hospital care. Carlos accepts that his close relationship with Eileen is due to his need for a source of warmth; he admits that his "hunger for affection, because of a lack of it in America, drove [him] towards Eileen" (Bulosan 236) but their relationship is neither defined by her tendency to care for him nor by their equally difficult and poverty-stricken pasts. Carlos says of Eileen: "She was undeniably the America I had wanted to find in those frantic days of fear and flight, in those acute hours of hunger and loneliness. This America was human, good, and real" (Bulosan 235). In Eileen, Carlos finds more than a continuous source of food and books, he finds the meaningful

and lasting companionship that eluded him in the United States, and with it he finds an America capable of something beyond the debilitating loneliness that defined Marian's life and the majority of his.

Mary Strandon's assumes the role of caretaker in a much different way; her role as an employer sets a different collection of rules and social standards in her relationship with Carlos. But Mary Strandon's role in Carlos' life was beyond the mere title of employer; the housework and menial labor Carlos completes is complimented by the opportunity to learn English from Dalmacio. Under the employment of Mary Strandon Carlos was also given a job in the library and, by extension, both a constant source of reading materials and ongoing intellectual stimulation for the first time in his then-short life. "I found great pleasure in the library," Carlos recalls. "…I was slowly becoming acquainted with the intricacies of the library. Names of authors flashed in my mind and reverberated in a strange song in my consciousness. A whole new world was opened to me" (Bulosan 70). It is clearly one of Carlos' most cherished working experience and, more importantly, it was the most significant childhood literary experience of a man who would grow to use language to both connect to the people of his second home and attempt to change that home for the better.

Mary Strandon did not introduce him to the concept of the United States—that honor belongs to his family—but she did introduce him to Abraham Lincoln, which proved to be just as important of a moment. The story of the poor boy who became president and died "for a black person" (Bulosan 70) captivated a young Carlos. Mary Strandon made a significant first impression for her homeland on Carlos. She established the United States as a nation where obstacles such as poverty could be overcome; where race is only a barrier to those ignorant or complacent enough to allow it to be; where Carlos' future was not necessarily restricted by his past. It is impossible to accurately speculate as to who or what Carlos would have become without this first impression—as it were, it took a significant portion of time for the brutality of a poor immigrant's life in the United States to wear Carlos' sanguinity into a cynicism and brutality, and even that needed to be compounded by the death of his father and only managed to be temporary. Bulosan does not mention Mary Strandon again after this first encounter, but her memory does stay with Carlos throughout his travels. After he is a published author Carlos remembers Strandon's hometown and visits it after her death, stopping to donate a copy of his first book to the local library. There is a reason Carlos remembered Mary Strandon after all those years, and a reason why it would do well for the reader to do the same. Mary Strandon was first to introduce Carlos to an America worth believing in. If Eileen was the America that Carlos was searching for, Mary Strandon was the first to teach Carlos that such an America existed. This is especially important when one considers the man who Carlos becomes in America; he would not have worked so diligently for labor unions if he believed he was in a nation that could never change.

The significance of possibility is arguably America's greatest quality in this novel. When Carlos first arrives in Seattle he believes that America is has been hidden just beyond the reach of immigrants, and if he would like to become an American he would have to find it. Despite the brutal habitat he discovers upon his immediate arrival into the United States, Carlos states that finally being in America made him feel "good and safe". "I did not understand why… I wanted to see other aspects of American life, for surely these destitute and vicious people were merely a small part of it. Where would I begin this pilgrimage, this search for a door into America?"

(Bulosan 140). He trusts that the America he heard of as a boy in Binalonan already exists in a fully evolved and final form. Bulosan's American experience in *America is in the Heart* is marked by the realization that, through the power of the effort of those who are willing to fight for it, the United States can evolve. After several years in the United States Carlos no longer believes that America had been finalized; the America Bulosan knows at the conclusion of the novel is in the process of being transformed. He states that they "must not demand from America, because she is still our unfinished dream. Instead we must sacrifice for her; let her grow into bright maturity through our labors. If necessary we must give up our lives so that she may grow unencumbered" (Bulosan 312). Here the United States is presented as neither a haven nor a hell; it is a work in progress, the responsibility of all those who call it home. America's streets are not paved with gold, but they could be.

The America of this novel could be whatever its people chose to make it. There is a reason that Carlos does not merely note how wonderful and exhilarating it feels to be a part of something vitally alive, but "to be a part of something vitally alive in America" (Bulosan 226). The United States offers Americans an incredible strength. It offers them the ability to morph their nation into something greater than themselves; the "bright maturity" that Carlos speaks of is the culmination of the efforts and sacrifices of hundreds of people over hundreds of years. It is what Abraham Lincoln died for and each of the authors Carlos read wrote of. This is why the question of citizenship is a recurring theme in the social campaigns Carlos' and his contemporaries wage against a prejudiced American government and system—the act of being American and contributing to this ongoing evolution is not considered a privilege to be taken lightly—and what some of the appeal of joining the American army at the outbreak of aggressive American involvement in World War II is rooted in.

A noteworthy aspect of this possibility is the intellectualism which seems to grow so easily within the United States. America is linked with education early in the novel, before Carlos has so much as considered leaving his first home, when he remarks upon the positive influence of American education on the Moros population:

> "When Macario went to teach in Mindanao, the Moros had not been entirely pacified. But some of their young men and women were already absorbing Christian ideals and modes of living. In fact, the better families were sending their children to America for a liberal education. The sudden contact of the Moros with Christianity and with American ideals was actually the liberation of the potentialities as a people and the discovery of the natural wealth of their land" (Bulosan 47).

This is the most significant of several examples of the United States' positive and civilizing influence on others. Indeed, the supposed enlightenment and modernity of the United States stands in sharp contrast to the Philippines and its people, which Carlos repeatedly describes as "backward and underdeveloped" (Bulosan 24). Macario's education, which Carlos's family sacrificed so heavily to maintain and rested all of their hopes upon, is also linked with the United States—Macario "was being educated in the American way" (Bulosan 20) and the educational system which they hoped would allow Macario to thrive only exists in the Philippines because of the United States' involvement after the conclusion of the Spanish-American War. Carlos' own sporadic education is also heavily influenced by the United States. During the short time he spends receiving a formal education he is a particular favorite of his

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aforementioned English teacher, who spent a period of over ten years living and working in the United States.

Carlos' informal education often comes through the influences of America and Americans as well. His employment by the American Mary Strandon leads to a myriad of opportunities for Carlos; outside of his occupation at Strandon's library, which allows Carlos to further deepen his connection with literature, Carlos' connection with Mary Strandon lead to his meeting Dalmacio and learning the English language for the first time. Later in his life, during his three year stint in a California hospital, Carlos connects with the United States through language and literature—he reads hundreds of novels, many authored by famed canonical American literary names along the lines of Herman Melville and Walt Whitman, in an attempt he calls his "discovery of America" (Bulosan 252). Even after he has lived in the United States long enough to experience the variety of brutalities that it has to offer, Carlos continues to associate America with intellectual and literary traditions and hopes that the knowledge he gains in the United States can one day be brought back to the Philippines and used to change the nation for the better. Through the power of knowledge Americans can chose to make the reality of America match the America of their dreams. America truly is in the hearts of Americans.

Conclusion

So if America truly is in the heart of its people, we can never know it without first knowing the people in question. What is an American?

It is a question that the United States has struggled with throughout its history and continues to struggle with now. If the word "American" is considered to be the sole right of legal citizens, then the term has only really existed since 1783, when the Treaty of Paris was signed and the military phase of the American Revolution came to an end. The legal definition of the word "American" has been subjected to an innumerable amount of edits and abridgements over the United States' relatively short life, usually following the model and tides of xenophobia as it evolved to meet the immigration patterns and social standards of the day. Throughout history, there have been a countless number of attempts to identify the "real" Americans from the "fake". These attempts, which include everything from the immigration quotas of the 19th and 20th centuries to Arizona's controversial 2010 immigration law, usually work to exclude certain people or groups from becoming Americans.

Immigrant quotas—the restriction which stated that only a certain specified number of immigrants of a certain ethnic group would be allowed to legally enter the United States—were prevalent in the United States for over a century and only removed from officially American policy in 1965, which means immigrants could be refused entry into the United States based on prevalence of their particular ethnicity as recently as fifty years ago (Immigration Support 1). During World War II, the American government was so enthusiastic to defend itself that then-President Franklin Delano Roosevelt, who is often remembered for his swift and effective policies to help the United States recover from the throws of the Great Depression as one of the greater minds to ever occupy the American presidency, signed an executive order which

imprisoned over 120,000 of Japanese ancestry—a significant portion of whom had been born in the United States and were thus American citizens in the eyes of the 14th Amendment—in 10 "isolation recreation centers" throughout seven states (National Park Services 1). The Arizona law in particular is one of many designed in the latter half of the previous decade; approximately 300 immigration-related bills were proposed in 2005; approximately 600 in 2006; over 1500 in 2007 and approximately 1500 in 2009 (CNN.com 1). Recently, illegal immigrants have been blamed by politicians and various public figures for everything from the poor job market to a recent wave of Arizona wildfires (CNN.com 2). The American people are much more concerned with detailing what they are not than describing what they are.

There is, of course, one important exemption to this observation: the ratification of the 13th, 14th, and 15th Amendments to the Constitution, which banned slavery, granted citizenship, and made it illegal for a man to be denied the right to vote based on race or former status of servitude, were by far the most significant inclusive laws concerning the definition of the word "American". The 14th Amendment in particular instantly changed the legal status of millions from property to citizens and intended that the rights of these new Americans be protected; it stated that

> No state shall make any law which shall abridge the privileges or immunities of citizens of the United States; nor shall any State deprive any person of life, liberty, or the property, without due processes of law; nor deny to any person within its jurisdiction the equal protection of the law. (Zinn 198)

This is a clear attempt on the part of the amendment's authors to make the men and women who are anticipated to benefit from this change in the Constitution "Americans" in the fullest and most ideological sense of the word. While the Reconstruction era after the American Civil War is best and fairly accurately remembered for its failure to effectively and fairly reunite two halves of a broken nation while delivering on the promise of the full benefits of freedom in America—and reconstruction certainly did sacrifice the enforcement and development of equality for African-Americans in an attempt to finally bring an end to a difficult and destructive period in the history of the United States—the 14th Amendment does not merely state that all those born and naturalized in the United States are legal Americans, but it legally protects their rights to the intangible elements of being American. Guarding one's right to avoid unpaid servitude is much more straightforward and clear of a task than guarding one's "life" and "liberty". In the 14th Amendment, the United States offers the same life and liberty that its Declaration of Independence demanded just under a century earlier.

But despite the great promise of the 14th Amendment, anyone who is at all familiar with American history should know how the legislation was reacted to and how it was manipulated by the vast majority of the American politicians and public. Even the very best of intentions can be fairly easily navigated by the clever and the cruel. Through manipulating the interpretation of the Amendment based on fault-finding and diction—the presence of the word "state" in the Amendment allows for some to refute the federal government's ability concerning the rights of colored Americans because it can be interpreted as solely a state's right to determine and answer questions of race and civil liberties—many managed to successfully avoid keeping any promises of racial equalization and it would be another century before the Civil Rights movement made

the idea of racial equalization truly realistic. Now, of course, on the bicentennial of the outbreak of a war that began with slavery and ended with millions of lost lives, the idea of denying a man or woman citizenship purely on the basis of race is not only heavily frowned upon by the majority but illegal in the eyes of the government.

So it seems that the people of the United States are a population that, despite all their great achievements and their stature as the beneficiaries of a wonderfully modern and global nation, has gotten caught up in an identity crisis. It does not know what it wants, only what it believes it cannot allow, and the latter category—which is so feverishly fought over—is subject to inevitable and never-ending change. Is there any fair definition for the term "American?" Is there absolutely any way one can reasonably summarize a people so diverse and rich that they are routinely baffled by the task of defining themselves?

Though the title of the novel says differently, Carlos seems to believe that Americans are in the hands. He repeatedly associates Americans as laborers—poor men, like the Mexican workers Carlos lectures to as an adult or the seemingly mythical President Abraham Lincoln Carlos first hears of as a child. Both Abraham Lincoln and the immigrant workers of the novel live through the land before they can move forward in their lives and continue their education or work elsewhere. Carlos tells these Mexican farmers that "we who came to the United States are Americans too. All of us were immigrants—all the way down the line. We are Americans who have toiled for this land, who have made it rich and free" (Bulosan 312). The young Carlos who first heard of Abraham Lincoln was not merely amazed because a white man would die for the African-American population, he was amazed that there was a place on Earth where a poor boy who spent his childhood living off of farm work could evolve into an American hero and respected social presence. The greatest Americans in Carlos' eyes are those who work on and work for America; those who believe in the value of honest work deserve to wear the term, and—with luck—they, like Lincoln, will be rewarded for their efforts.

The title of Bulosan's novel derives from a specific passage in the book, an address from Macario to their small group of friends. America, Macario says, is

> …not a land of one race or one class of men. We are all Americans that have toiled and suffered and known oppression and defeat, from the first Indian that offered peace in Manhattan to the last Filipino pea pickers… America is not merely a land or an institution. America is in the hearts of men that died for freedom; it is also in the eyes of men that are building a new world. America is a prophecy of a new society of men: of a system that knows no sorrow or strife of suffering. America is a warning to those who would try to falsify the ideals of freemen.

> …We are all that nameless foreigner, that homeless refugee, that hungry boy, that illiterate immigrant and that lynched black body. All of us, from the first Adams to the last Filipino, native born or alien, educated or illiterate—We are America! (Bulosan 189)

Here Macario manages the daunting and summarizes the concept of America into one concept: America is nothing more than its people. It is the manifestation of the hopes, dreams, and efforts of Americans. America is Americans. Without the people who believe in it enough to

fight for its future and tolerate its intolerances, the word "America" would mean nothing. This is a line of thinking that should resonate with anyone who is proud to wear the term "American"— it is something that children in the United States are taught from a young age. America is a haven; America is possibility; America is the land of the free and the home of those brave enough to find freedom. This is the America celebrated every Fourth of July. The American people have no trouble at all agreeing on the intangibles—it is simple to say that America is life, liberty, and the pursuit of happiness. It is the specifics that continue to elude. America may be an American, but can America be measured in a law?

There is an infinite number of facets that must go into that decision. But Carlos Bulosan and America is in the Heart make wonderful work of emphasizing two points that should always be considered when trying to determine the meaning of the word Americans.

First, that defining the term "Americans", whether in informal or in legal terms, is and will probably forever continue to be an imperfect art. This nation is nothing if not impossibly diverse—Carlos, who had never so much as seen a person of color before his immigration to the United States, associates with a vast myriad of different cultures and people once he arrives in America, from African Americans to French to Mexicans to Koreans, from those whose families have lived in the United States for generations to those who have only recently found the means to journey to America. The United States is also a nation persistently evolving; there is no aspect of American life that is always changing, but there is always some aspect of American life undergoing change. This is a result of the people themselves—as long as there is someone with the will and means to make this country greater, someone like Carlos, who trusts that there is something special and "it was an exhilarating feeling—being a part of something vitally alive in America" (Bulosan 226), the United States can never remain in rest for long. America may never become perfect, but it certainly will not be for a lack of effort on the part of its people. The greatest strength of this nation is its ability to inspire.

Second, the inspiration the United States is continuously able to provide is more than strong enough to travel beyond the boundaries of the nation itself. In the last impression the reader is given at the end of the novel, Carlos describes America with both a sense of hope for its future and a genuine affection for it in the present.

> I glanced out of the window again to look at the broad land I had dreamed so much about, only to discover with astonishment that the American earth was like a huge heart unfolding warmly to receive me. I felt it spreading through my being, warming me with its glowing reality. It came to me that no man—no one at all—could destroy my faith in America again… I knew that no man could destroy my faith in America that had spring from all our hopes and aspirations, ever. (Bulosan 326-7)

Carlos meets an outstanding number of difficulties in the United States. He acknowledges that he is living in which citizens can very successfully "work as one group to deprive Filipinos of the right to live as free men in a country founded upon this very principle" (Bulosan 287); he is repeatedly verbally, physically, and sexually abused; he works in a myriad of employments which are just as difficult, if not more so, as the work he did as a child in the Philippines; he is denied and punished for desiring the basic rights he believed were given to all who entered the

United States. Despite the uncountable number of hardships that meet Carlos throughout his life as an immigrant in America, he ends the novel marveling at the wonders of life in the United States. The freedom the United States of *America is in the Heart* offers is intensely difficult to obtain. The fact that the last words of *America is in the Heart* were dedicated to singing its virtues says something incredible about the United States itself. It says that, regardless of the United States' injustices and ugly flaws, the nation as a whole is still worth knowing. It is still a beautiful country. It is still capable of beautiful things. Carlos was not born an American but he managed to become one. He, like the American authors and historical figures he spends three years absorbed by, was inspired.

In *America is in the Heart*, Carlos Bulosan does not provide an effective blueprint of the United States. One would imagine that Bulosan, as great an author as he may be, could not manage the feat even if he wanted to. If a reader is to take anything from the portrayal of America in this novel it is that America is in the hearts, minds, and dreams of Americans, and Americans are those both capable of and willing to give life to their dreams.

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The Gendered Language of Sports Teams Names and Logos

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Abstract

For professional sports organizations, team names and logos represent a group's central identity, reflecting geographic location and important attributes pertaining to strength and skill. For minority groups and women, however, team names and logos have also served as a site of oppression in the sports domain. This study examines this problem as it is apparent in team names and logos chosen to represent each of the 44 teams belonging to the National Football League and Lingerie Football League. Drawing on previous research on the topic of team names, logos, and sports team identity, the study provides argues that despite gender-exclusive nature of the leagues, gendered-language is still used to define, demean, and derogate women's teams.

Introduction

As a cultural institution, it can be argued that Sport represents a microcosm of American society at large. The evident social organization around the identity and esteem needs of men and its preservation as a male-dominant environment reflects the value placed on patriarchal ideology and an inherent motivation to preserve social, cultural, ideological, and economic power among men. Bryson (1987) argues that this system is maintained through an exclusion of women through direct control, ignoring, definition, and trivialization. Daddario (1998) further suggests that these practices are legitimated through representational bias in sports and by sports media, an emphasis on the physiological difference between men and women, questions of sex and sexuality, and a primary focus on male spectatorship. This article recognizes each of these processes, and focuses specifically on how team names and logos are implicated in the marginalization and trivialization of women's teams and female athletes.

Literature Review

Team names and logos are a keystone of identity for sports leagues, teams, and players. Through the use of common sign and symbol systems – including names, colors, and emblems – leagues, teams, and players are afforded greater recognition and recall of significant

characteristics by members of both the in-group and out-groups. In-group members (owners, administration, coaches, and athletes) assemble around this identity to communicate solidarity, distinguish teammates, and detect opponents. Out-group members (local residents, sports fans, and spectators) use this identity as a point of social organization. Through donning a team's colors, emblems, and other insignia, outsiders are able to communicate their identification with a team, demonstrate support for a particular team or sport, and participate in other facets of sports culture.

As a central element of group identity, team name represents more than a label (Eitzen & Baca Zinn, 1989). Although the practical purpose of a team name may be to provide no more lexical content than a street sign, culture, context, and common use of language embeds a range of possible meanings and interpretations (Smith, 1997). Therefore, the functional purpose of a team name is to communicate only the most important group attributes or self concept. Commonly, this is achieved using a formula consisting of a geographic identifier and one modifier usually alluding to geography (Baltimore Charm), animal types (Jacksonville Jaguars), weather and natural disasters (Green Bay Chill), natives (Washington Redskins), historic icons (Tampa Bay Buccaneers), or other devices conveying strength, power, and aggression (Slovenko, 1994). This is supported and reinforced by the lexical and visual content of logos.

While team names and logos for most groups define group identity positively and encourage social support, prior research reveals that this is not necessarily true for minority groups. According to Eitzen and Baca Zinn (1989) in their study *The De-athleticization of Women: The Naming and Gender Marking of Collegiate Sports Teams,* names referencing these groups or assigned to teams for these groups create bias and reinforce stereotypes by emphasizing ethnic and gender identity over more salient characteristics that are relevant to the nature of sport. Consequently, ethnic and gender minorities are trivialized as athletes and their accomplishments minimized. For women's teams in particular, strategies that have aided in this process of marginalization include the use of physical markers (*belle*), terms such as *girl or gal*, feminine suffixes (*ette, esse*), labels such as *lady or woman*, male names with female modifiers, or double gender markers, among others (Eitzen & Baca Zinn, 1989). By using gender differentiation to separate women and men, the authors argues that "language reflects and helps maintain the secondary status of women by defining them and their place" (p. 364). In doing so, team names, situated within historical and social context, also reveal some of the underlying politics at play.

While the use of gendered terms is not innately offensive or oppressive, understanding language in this way demonstrates that naming is not an arbitrary process. Instead, team names are indicative of the existing rules present in society (Spender, 1980). With regards to the American culture of naming, then, Eizten and Baca Zinn (1989 p. 364) note that it is important to recognize how:

> "Patriarchy has shaped words, names, and labels for women and men, their personality traits, expressions of emotion, behaviors, and occupations. Names are badges of femininity and masculinity, hence inferiority and superiority.

Therefore, name labels, despite intent, are latently responsible for contributing to gender bias and reinforcing gender stratification prevalent in society and in sport.

The present study builds on these findings by examining the implications of naming practices for women's sports team and leagues at the professional level. While prior research has focused on team names (Slovenko, 1994) and their relationship to gender (Smith, 1997; Eitzen & Baca Zinn, 1989), none have attempted to apply conclusions to the professional domain. However, it is apparent that gender differentiation in language is as critical an issue in this environment as it is at the level of high school and collegiate sports. This is particularly evident in sports in which males and females participate equally. Nationally, athletic associations such as the National Basketball Association, Major League Baseball, and the Professional Golf Association, all refer to an exclusively male athletic environment. Conversely, national women's leagues are modified to include feminine references such as "women" and "ladies". Examples include the Women's National Basketball Association, and Ladies Professional Golf Association. This study argues that although there is no statute that legitimates a separation of male and female teams for the same sport, or prohibits either gender from participating under the auspices of the same league, through gender differentiation, male and female sports leagues are situated to reinforce the naturalized system gender order present in sport.

A Brief Description of the Leagues

Football is commonly regarded as the most male and one of few remaining sports for reserved for men (Christiensen et al, 2001). Modeled after European rugby football, the sport pits men against men in a violent clash of aggressive competition. This drive to demonstrate power and control is considered "properly virile and thus good training for American boys (Christensen et al, 2001, p 422). In line with cultural values, however, football has been deemed inappropriate for women. As a result, football maintains identification with maleness and masculinity. Still, since 1941, women have sought to establish a presence in the sport, through involvement with high school football teams, participation on men's teams, and the establishment of leagues of their own. Nevertheless, American knowledge of football is limited to the National Football League, established in 1920.

The National Football League (NFL) is currently recognized as the highest level of professional American football (compared to amateur and arena style football). The league consists of an American Football Conference (AFC) and National Football Conference, made up of thirty-two teams in total. Teams are divided evenly (sixteen each) into each conference, which is further separated into four divisions (North, South, East, West), with four teams belonging to each. The regular season for the sport runs from September to January, with teams competing within conferences for six playoff spots, in the hopes of competing in the national championship, known as the Super Bowl.

The Lingerie Football League (LFL) represents one of several American Football leagues for women (other leagues include Women's Professional Football League (1965), National Women's Football League (1970), Women's Professional Football League (1999), Independent Women's Football League (2001), and Women's Football Alliance (2008)). Created in 2009, the LFL is accredited as being the fastest growing sports franchise for women in the nation (Chandler, 2011). It is modeled after a pay-per-view special called the *Lingerie Bowl*, originally intended as an alternative to the NFL's Super Bowl halftime show. Currently, the league consists of an Eastern and Western Conference, with six teams belonging to each. Similarly to the NFL,

lingerie football is a full-contact style of gridiron football played in professional stadiums and arenas across the United States. Teams compete against teams within the same conference in the hopes of competing in the championship known as the Lingerie Bowl. Individual athletes from each team may also be chosen for participation in the annual All Fantasy Game.

Data and Methodology

The data sources for identifying team names and logos were the national websites of the National Football League and Lingerie Football League. Each website provided a current roster of active teams, logos for each team, and hyperlinks to each team's independent website for further information. A total of 44 teams were identified (NFL: 32, LFL: 12). Formerly associated teams and teams scheduled for future expansion were omitted. NFL teams included the *Arizona Cardinals*, *Atlanta Falcons*, *Baltimore Ravens*, *Buffalo Bills*, *Carolina Panthers*, *Chicago Bears*, *Cincinnati Bengals*, *Cleveland Browns*, *Dallas Cowboys*, *Denver Broncos*, *Detroit Lions*, *Green Bay Packers*, *Houston Texans*, *Indianapolis Colts*, *Jacksonville Jaguars*, *Kansas City Chiefs*,. *Miami Dolphins*, *Minnesota Vikings*, *New England Patriots*, *New Orleans Saints*. *New York Giants*, *New York Jets*, *Oakland Raiders*, *Philadelphia Eagles*, *Pittsburgh Steelers*, *San Diego Chargers*, *San Francisco 49ers*, *Seattle Seahawks*, *St. Louis Rams*, *Tampa Bay Buccaneers*, *Tennessee Titans*, and Washington *RedSkins* Teams for the LFL included *Baltimore Charm*, *Chicago Bliss*, *Cleveland Crush*, *Green Bay Chill*, *Las Vegas Sin*, *Los Angeles Temptation*, *Minnesota Valkyrie*, *Orlando Fantasy*, *Philadelphia Passion*, *Seattle Mist*, *Tampa Breeze*, and *Toronto Triumph*. League names were also assessed.

To determine whether or not a name label represented gender neutrality or gender linking, each team name was separated from its regional identifier (e.g. Philadelphia Passion, only Passion) to be first defined denotatively using either Merriam-Webster (or Wikipedia where noted), and then defined connotatively according to context (sponsoring league), culture, and common use of the term. In addition to being evaluated individually, team names were also assessed between leagues. League Names were also assessed for gender-linking through inclusion of physical markers, or other gender identifying terms.

Figure 1
National Football League Logos
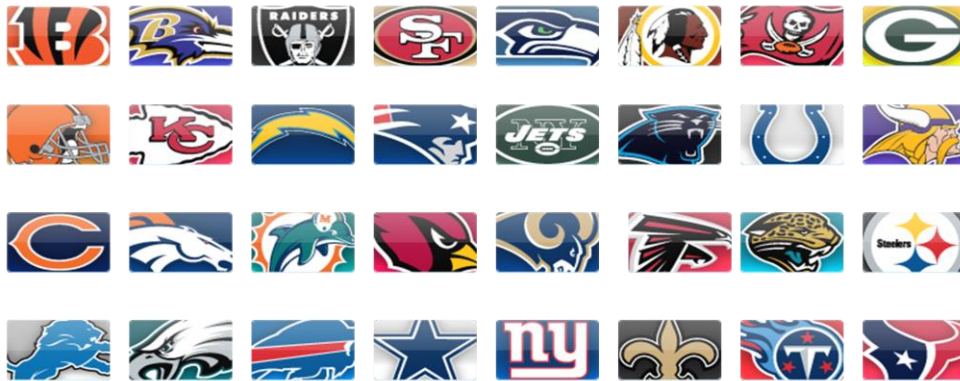
To determine how logos factor into reinforcing denotative and/or connotative meaning of team names and enhancing team identity, each of the 46 logos (leagues and teams) were evaluated according to whether the logo used a literal (adhering to denotative definition) or interpretive (adhering to connotative definition) image, and whether gender-linking was used in text or images. In addition to being evaluated individually, team logos were also assessed between leagues.

Figure 2
Lingerie Football League Logos
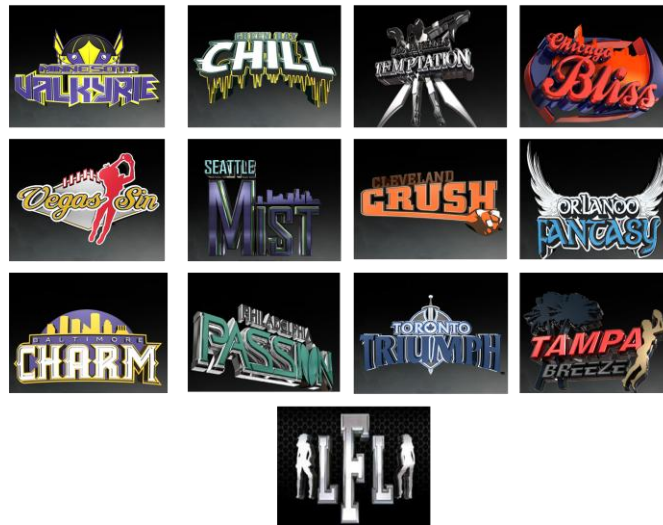
Analysis

LEAGUE NAMES. In the present study, the NFL represents the socially undisputed national sports leagues for men's participation in football. Therefore, no gender-linking is apparent and none is required. For the LFL, which positions itself as an American league for women, however, a unique feminine qualifier is used. Unlike other sports leagues for women, which generally include terminology such as *women* or *ladies*, the LFL uses the term *lingerie* to communicate the feminine aspect of the league. While this is not apparently necessary, it does follow normative standards for naming women's leagues. Used here, the term *lingerie* can imply a range of meanings and associations. Given the importance of culture, context, and common use however, these meanings can be limited to a very specific reference.

The origin of *lingerie* is French, and refers to undergarments (irrespective of gender). However, in the American sense of the word, *lingerie* is defined as intimate apparel for women. Thus female gender is evoked. Using this meaning, not only are audiences able to infer details about the league, they are further inclined to speculate about the physicality and caliber of these female players. This has negative implications for the type of conclusions and biases drawn. Compared to other women's sports leagues, which use general terms associated with females, the use of the term *lingerie* suggests a very specific type of woman. Cultural associations between women and lingerie evoke images of modelesque or hypersexualized women. This is supported by the fact that lingerie is distinguished from typical cotton underwear by its revealing designs. It is further eroticized through the use of sheer, delicate, and close-fitting material (e.g., lace,

chiffon, silk, spandex, etc.), risqué design (thong underwear, negligees, baby dolls), girlhood accoutrements (e.g. bows, ruffles, ribbons), and common associations to romantic, personal, and pornographic settings. These qualities not only enhance associations with the feminine, but also transfer to players, emphasizing the body and suggesting a certain standard of accepted beauty. Generally, in the mainstream, lingerie is associated with women who are cosmetically flawless and generically feminine (thin, long hair, make-up).

Combined with the concept of a football league, the use of *lingerie* evokes dissonance. Lingerie evokes salaciousness, sensuality, and sex. Football evokes force, toughness, and nerve. Therefore, where these terms intersect, the traditional characteristics of football are destabilized. Consequently, lingerie football is presented as a "powder-puff", less skillful variation of the sport. As a result, women's athletic abilities are compromised by an emphasis on physicality and sexuality.

TEAM NAMES. As discussed, team names are a central element of group identity. Names are usually inspired by geography, animal types, human figures (warriors, natives, patriots), or other symbols of power and skill. This standard of naming in supported and reinforced by the thirty-two teams that make-up of the NFL. Of the teams, fifteen cite animal types (birds: 5, undomesticated cats: 4, other wild mammals: 6). Species of birds include *Cardinals*, *Falcons*, *Ravens*, *Eagles*, and *Eeahawks*. With the exception of *Cardinals* and *Ravens*, the remaining species of birds represent birds of prey. Predatory birds hunt and feed on other animals. As a result of these hunter-like sensibilities, birds of prey are considered swift, cunning, and aggressive. These qualities are also apparent in the undomesticated cats and other wild mammals cited in NFL team names. Animals such as *Panthers*, *Bears*, *Bengals* (a species of tiger), *Broncos*, *Lions*, *Colts*, *Jaguars*, *Dolphins*, and *Rams*, are commonly recognized for their large size, strength, and domination in the natural environment. These traits are also symbolic of the teams to which these names are assigned.

Other team names for the NFL cite human figures such as patriots (1), natives (2), aggressors (4), and historic icons (5). Of these, names such as *Packers, Steelers, 49ers,* and *Browns* pay homage to significant icons of geographic history. For locals, these names convey prestige, honor, pride, and esteem. Others, such as *Buccaneers, Patriots, Vikings, Giants, Raiders,* and *Titans*, celebrate the spirit of conflict and aggression evident in football. Symbols such as *jets* and *chargers* also represent the power and force athletes are expected to embody on and off the playing field.

Conversely, team names for the LFL do not evoke strong emotions or reference literal objects and characters. Instead, the Lingerie Football League relies on thematic naming, that focuses on positive emotional states. As opposed to evoking strength, aggression, or skill, these team names evoke happiness, joy, and curiosity. While many of the names (*Passion, Sin,* and *Charm*) reference geography (i.e. Philadelphia is known as the city of brotherly love, hence *Passion*), the characteristics referenced do not communicate as rich a history as team names for the NFL. Also, names that reference weather (*Mist, Chill,* and *Breeze*) are not as strong as those commonly used for men's sports including *Storm* and *Hurricane.* Football is not a sport that most would consider charming, fantastic, or sinful. Therefore, these names demonstrate an obvious disconnect between the league and football enthusiasts, except where gender is recognized. Where gender is recognized and the concept of the league is understood, spectators

come to understand the LFL as a spectacle of sport, designed with the male gaze in mind. These names are not intended to suggest true athletic ability or power, but as Eizen and Baca Zinn (1989) states to "define women and their place." Consequently, lingerie league players are not valued as athletes and their athletic abilities undermined.

Stronger names, such as *Valkyrie*, *Crush*, and *Triumph*, which could carry some weight in the male sports domain, lose their power in connection to the league. The term *Crush*, as it is applied to the LFL could easily refer to an overwhelming feeling of adoration for a person of interest. While, it could also mean to defeat or overcome. Furthermore, in the context of the league, the term *Valkyrie,* despite its strong and forceful message is defined by Merriam-Webster as "any of the maidens of Odin who choose the heroes to be slain in battle and conduct them to Valhalla." This can be understood as a gender-marked counterpart to the NFL's *Vikings*. As such, it faces the same consequences recognized for women's teams at other levels.

LOGOS. As discussed, logos enhance meanings and associations with team names. Through the use of images, teams are able to limit lexical content to very specific definitions and associations. In comparing logos, some of the same general themes of male privilege become apparent. Again, the NFL, compared to the LFL, includes no gender-markers. Instead, the NFL logo takes on a patriotic theme. Shaped like a shield, in addition to the league's initials, it also features the national colors (red, white, and blue), a football, and eight stars (representative of its divisions). Other logos for the NFL also feature no gender marking and depict literal interpretations of the team names. Logos for teams including animals in the team name include a depiction of that animal in the logo. Logos for teams featuring human figures also tend to include depiction of those figures. Other teams use some combination of team colors, initials, and/or geographic symbols to enforce team names.

The logo for the LFL depicts the league's monograph at center (The letter "F" appears larger than the other two letters, which can either suggest an emphasis on football), surrounded on either side by one silhouette. Although the gender of the silhouettes is unclear, the posing of each silhouette (one knee up, one hand on hip) and thin, curvaceous frame suggests that they are both female. The outline of the silhouette at the head also suggests that both players have longer hair, also indicative of females. The smooth lines along the body further suggest that both silhouettes are either nude or wearing close fitting attire. Through these depictions, the LFL logo reinforces the league's obsession with the female body and increases associations with ideal beauty. Similarly, three of the team logos for the LFL also feature female silhouettes (*Temptation, Sin, Breeze)*. Although race is not considered in this study, it is noteworthy that of the four human figures depicted in logos (both LFL and NFL), all of them appear white unless referencing natives.

Conclusion

Team names and logos in football serve as intersecting sites of oppression for women in sport. While a number of previous studies have examined this problem as it occurs at the high school and college level, none have examined how this phenomenon comes into play at the professional level. However, this study shows that differentiation through naming and logos is just as critical a problem in the professional sports domain. As discussed, team names, colors,

and logos represent the core of a group's identity. When gender-linking is used to emphasize certain characteristics over others, women's participation in sport is significantly minimized. Given the socially constructed language of sport, it is important to understand the implications of such labeling and logo use on the identify formation and esteem needs of women. Although terms such as lady, girl, and woman are not independently offensive, given the significance of context, connotation, and common use to the interpretation of meaning, conventions for deciding team names should be reconsidered.

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Recidivism: Employment Opportunities after Incarceration

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Abstract:

This article reviews evidence linking incarceration and the likelihood of obtaining employment after serving time in prison, with particular focus on African American men. Data come from Sumter's (2001) Religion and Post-Release Community Adjustment Survey. This research explores the predictors of post prison employment. Findings show that the length of time served, marital status, post-prison programs and whether an ex-convict attends religious services after being released increase the chances of obtaining and maintaining employment.

Key Words: *incarceration*, *recidivism*, *religion*, *post-prison*, *ex-convicts*.

Introduction

The alarming growth of incarceration in the United States over the past few decades has lead to countless studies on the causes and effects of this growth. Since the early 1970s, the incarceration rate has risen precipitously in the United States, and this growth and expansion has profoundly impacted African American men. According to International Centre for Prison Studies, The United States, consist of only five percent of the world's population, but houses 25 percent of the inmate population (Loury, 2007). In time, the majority of these inmates will be released from prison and have to reintegrate into society. What are the possibilities for social and economical mobility for theses ex-inmates? In order to be productive and not face returning to prison these inmates will have to find and maintain employment. It is evident that the sentences inmates serve keep them out of the labor markets for extended periods of time; consequently influencing the type of job and pay that they will be able to obtain post-prison. The prospect of their social and economic mobility is seriously moderated by the prison label.

The present study examines factors that predict post-prison employment in a sample of male inmates from 12 prisons (Sumter, 2001). The data comes from telephone and individually completed surveys as well as from the prison history of the inmate. Variables that are examined

to determine predictors of post-prison unemployment include age, race, education, length of incarceration, and religion.

Patterns of Incarceration

Loury (2007) examines why the incarceration rate is so high in America. Loury suggested that the rate has increased because America moved from rehabilitative model to a tough on crime model. America no longer wanted to rehabilitate criminals but is determined to keep them out of society. In doing so, the number of prisoners increased because there were individuals that were being given longer sentences and at the same time, new people were being admitted, adding to the number of those already incarcerated. A significantly large proportion of minorities were incarcerated because of the ease with which they could be caught committing crimes or breaking the laws in public view, as oppose to their White counterparts who usually broke the laws in their homes or cars. According to Fagan, West and Holland, for instance:

> Buyers may come from any neighborhood and any social stratum, but the sellers
> at least the one who can be readily found hawking their wares on the street corners
> and in public vestibules - come predominantly from the poorest, most non-white
> parts of the city and the police with arrest quotas to make, know right where to
> find them. (p.8)

During the time of the prison boom in the 1980's, the police had arrest quotas that had to be met, so they patrolled the neighborhoods that they knew would bring them arrests. This played a major role in the racial disparity in the prison systems across America. Minorities were being incarcerated at a higher rate than whites. An estimated 11% of black males and 4% of Hispanic males in their 20's and early 30's were in prison at midyear 1999 (Beck, 2000). More than one-third of black male dropouts aged 20 to 35 were in prison on an average day in the 1990's (Western et al., 2001). There were more minorities in prison than there were in school. Minority males were incarcerated at much younger ages than White males due the fact that they lived in poor neighborhoods and high crime areas. Bruce Western (2006) points out that the incarceration ratio of black to whites was eight to one. Policies such as the three strikes law, and mandatory minimums added to the incarceration levels, as well as the fact that states began to do away with limited parole. These policies led to an increase in the prison population and consequently, more people were returning to society with prison records. In order to reduce the prison population and the numbers of ex-convicts that recidivate, it is important to determine which factors contribute to successful functioning outside of a prison. The most important of these may be the ability to get a job upon release. The factors that increase the likelihood that inmates will get jobs post-prison, is the focus of the present study.

According to Michelle Alexander's book, *The New Jim Crow* (2010), drug offenses are one of the most important causes of increased incarceration in the United States. She points out that when looking at drug offenses there is a racial bias in prisons. 1 in every 14 African American males was behind bars in 2006, compared to 1 in every 106 Whites. Alexander goes on to state that two-thirds of federal inmates are made up of people serving time for drug offenses and one-half of state inmates are serving time for drug offenses. Alexander identifies police discretion, legal misrepresentation, bad deals and time served as reasons why so many people are currently incarcerated. The police have been given more discretion to stop and frisk

individuals that they feel are committing crimes; discretion given to them by cases such as the *Terry v. Ohio* (1968). In this case, the Supreme Court ruled that the Fourth Amendment prohibition on unreasonable searches is not violated when a police officer stops a suspect on the street and frisks him without probable cause to arrest, if the police officer has a reasonable suspicion that the person has committed, is committing, or is about to commit a crime and has a reasonable belief that the person may be armed and presently dangerous. This discretion allowed police to stop and search individuals that the police found to be suspicious and the police no longer needed probable cause. Legal misrepresentation is also a factor because people charged with crimes were not advised of their rights, especially their right to counsel. Most individuals were worried about being given the mandatory minimum sentence for the crimes that were committed and agreed to plea bargains without consulting an attorney. Because of mandatory minimums, innocent people were taking deals so that they would not go to jail for extended periods of time (Alexander, 2010). Sentences that were being given to individuals for committing drug crimes began to be lengthier than the sentences given to people who committed crimes such as murder or other violent crimes. First time drug offenders were being given life sentences because of bad deals and mandatory minimums. These factors have all contributed to the increase in the high rates of incarceration.

Employment and Recidivism

The focus of this study is on factors that contribute to employment after prison. Researchers have focused on the relationship between being released from prison and gaining employment as well as chances of recidivism. Tripodi, Kim and Bender (2010) examined whether released prisoners who obtained employment have a lower likelihood of being re-incarcerated than released prisoners who did not obtain employment. They also examined the prisoners who did recidivate, and determined whether or not the prisoners that did have employment, remained crime free, longer than those that did not obtain employment. This study was conducted over the course of 4 years with a random sample of 250 male parolees in Texas. Tripodi et al. (2010) found that individuals that obtained employment when released lowered their recidivism risk by 68.5% and averaged 31.4 months before being re-incarcerated, with a range of 9 to 60 months. Individuals that did not obtain employment averaged 17.3 months before being re-incarcerated with a range of 4 to 47 months, showing that employed ex-prisoners remain crime-free for a longer period of time than those that are unemployed. This study provides support for the idea that an individual that finds employment after being released is less like to recommit and even if they do commit another crime, they will not do it as quickly as someone that is not employed. Prisons cost citizens billions of dollars a year. To house one inmate is about $ 22,650 (Expenditures/Employment, 2001) year, when multiplied by a population of 2.2 million, there are staggering consequences for society as a whole. By providing inmates and former inmates with adequate programs and services that they need in order to obtain and maintain gainful employment, it is likely that there will be less individuals returning to prisons. This demonstrates the importance of examining issues which can decrease recidivism and employment has the potential to contribute to a reduction in recidivism.

Another focus of post-prison adjustment research is the inmate's view of factors that would contribute to their post-prison success. Malott and Fromader (2010) study was conducted to determine if current inmates believed that additional resources would be beneficial to them and what they thought would help reduce the recidivism rate. The results of this study showed

that the inmates felt that they are not given the proper resources they need in order to survive and remain crime free. The Bronfenbrenner's Ecological Theory was applied to this study. The Ecological Theory supports that changes in societal environment have a notable influence on individuals (Santrock, 2004). This study suggests that inmates feel that if they are provided with better resources such as post-incarcerate employment, education, family life education and therapy that they would be better prepared to function as productive citizens in society. With a sample size of only 102 participants and the lack of diversity this study cannot be generalized to all people serving time in a prison. The findings do, however, support the idea that there is a need for better resources for individuals during incarceration and upon release. The current research examines the effects of prison opportunity experience and based on this research, I would expect that such opportunities would have an effect upon release from prison.

Support from re-entry programs is another factor which can contribute to post-release success and is examined in current research. Nixon, Ticento-Clough, Staples, Johnson-Peterkin, Zimmerman, Voight, and Pica (2008) examined the efficiency of re-entry programs. The programs include such issues as educational and vocational training. Their study reveals that the programs that are currently in place are not sufficient enough to help people released from prison to integrate back into society. They affirm that these programs lack the most beneficial things, such as basic skills. Re-entry programs may help individuals obtain a GED, or may even certify them to do a certain type of job, but they do not help them with socialization into work and family. These individuals are taken out of society and reconditioned to live the way of the prison, where they are told when to eat and work. When they return to society they are expected to conform to the ways of society and be productive. The ones that do obtain employment suffer because they do not know the norms of a work environment, which include things such as reporting to work on time, being productive and being able to take instruction from superiors. Individuals that have been incarcerated do not always respect these norms because they tend to resent authority figures and, for the most part, despise rules. While they were incarcerated they had no choice but to follow the rules of the institution for fear of reprimand. In the world outside of prison, workers are given a select amount of chances and then are fired with the consequence of losing a paycheck. According to David K. Shipler (2005) most employers would prefer to hire employees that at least have "soft skills" (p126). Soft skills such as diligence, punctuality, and a can-do attitude, are skills that some employees lack. Shipler explains that these things are usually learned within the family, but the family forfeited this responsibility and passed it on to school. In turn, schools forfeited the responsibility and passed it on to employers! If an ex-inmate was never taught these things, how can he/she be expected to know to do them?

Another problem that the inmates face is being overly aggressive. In prison, inmates have to continuously be alert from other inmates trying to harm them or do something wrong to them that, when they are in society, they tend to feel as though everyone is out to get them. This can be a bad trait to a place of business, because it can cause tension with co-workers and may reflect poorly on the employer if the ex-convict addresses clients/customers in the wrong manner. In order to help ex-convicts to be employable, the inmates should be required to take some courses on work etiquettes that will be beneficial to sustaining employment and not only just obtaining it. Although the current study does not include information about work socialization, it does include factors which could assist socialization such as religiosity.

Robert Riggs (2010) also examines the prison re-entry industry (PRI). The PRI is setup to help formerly incarcerated individuals who have some education and a certification in a

particular field. Riggs claims that this program does actually work to help employ ex-convicts that meet the qualifications. As time goes by, the need for employees who can relate to the high number of people that are being released will increase. Education and certification are only one portion of what you need to qualify for help from the PRI; an individual must also have experience with being around and working with former inmates. The jobs that are obtained thru PRI include opportunities such as a substance abuse counselor in a half way house. Riggs uses a hypothetical scenario to explain how the PRI functions when it comes to hiring for positions like this, with his hypothetical scenario about the need for a counselor of a program that is mandatory for former inmates that are on parole and probation. In this scenario, there are three people that apply for the position and the choices are a college graduate that majored in psychology and minored in substance abuse counseling, a formally incarcerated person with certification and 10 years experience running a prison substance abuse program, and third person who also majored in psychology and minored in substance abuse counseling but had 10 years experience in counseling. (p.580) According to Riggs the person that was formerly incarcerated would obtain the job because he has experience working with people that were previously incarcerated. Riggs is a former inmate that found employment through PRI because he qualified; he took certification courses and some college courses while incarcerated. Riggs example would suggest that his views on this particular program are in fact biased. A successful re-entry program should be made in a way that they would be beneficial to all individuals that are released from prisons. This research may not be able to be generalized since it is based on the experiences of one person.

Predictors of Post-Prison Employment

Age

When using age as a predictor of post-incarceration employment, several studies confirm that as an inmate ages, they are less likely to engage in criminal activities (Shover 1996; Freeman 2008; Uggen 2008). The age curve suggests that criminal activity peaks in the late teens. Growth in the U.S. prison population however, has been accompanied by a significant aging of the prison population. This is due to sentencing policies that require prison time for crimes such as nonviolent property or drug crimes. The lengthy sentences that are given have caused inmate population mean age to be higher (Pettit & Lyons, 2009). In most cases as an inmate matures the likelihood of committing crimes decreases and the attitude shifts. As an inmate ages, being employed and participating in society becomes more important. "Older offenders are more willing than younger men to accept employment –even at low wages- in exchange for the legitimacy attached to working in the legal labor market" (p. 730). The older that an individual gets, the more likely he is, to realize the importance of responsibilities and the things missed while incarcerated. Family and freedom outweighs the benefits of crime when the individual compares the two. A younger inmate is less likely to look at these things as important because to such inmates, the benefits of criminal activity outweigh that of working a job paying minimum wage. I expect that age will have an effect upon whether or not an inmate obtains a post-prison job with older inmates having a greater likelihood than younger inmates.

Race

Using race as a predictor of post incarceration employment studies have shown that an African American male is less likely to obtain employment than their white counter-part (Pager 2007; Bertrand and Mullainathan 2004). These studies conclude that employers predetermine whether or not they will hire an individual based on their criminal record and factors that signify the applicant's race. Race can contribute to the outcome of employment because Blacks are often portrayed as criminals by the media and societal stereotypes. When doing a match paired designed study for applicants without any previous criminal record, Pager (2007) found that African Americans were less than half as likely to receive callbacks as equally qualified Whites. Pager suggests that blacks would have to apply to double the amount of jobs than Whites apply to in order to obtain the same prospective as their counterparts. Pager also discovered that a white applicant with a felony criminal background had equal callback opportunities as a black applicant without a criminal record. Employers see the White applicant as "no more risky" (P.91), than a Black applicant without a criminal record. This study demonstrates that race has an influence on employment opportunities.

While many companies claim that they are equal opportunity employers, it is not hard to move away from the stereotypical image that is portrayed in the media today. In the news, African Americans are usually shown to be aggressive criminals. They are usually shackled and led away by white officers; if there is a picture used, it is usually a mug shot that was taken when the individual was taken into custody. The media usually shows more coverage of African American crime and trial than that of a White individual that is usually not shackled in most cases, but standing among family members. White suspects do not receive as much media coverage as Blacks. Such things enhance society's perception of African Americans, and therefore cause people to fear the angry Black criminal. Consequently, Pager (2007) states that even African Americans with no history of criminal involvement are likely to suffer some of the same penalties as do ex-offenders of any race (p.95).While media representation could be seen as a major influence; it is by no means the only influence of racist attitudes and beliefs.

Bertrand and Mullainathan (2004) conducted a study to determine whether or not markers such as an applicant's name would play part in whether or not they received a call back for a job interview. Employers may assume the race of a person based upon the person's name. In this study the researchers sent out two sets of resumes to companies that were hiring for administrative support, clerical and customer service positions. One set of resumes contained names such as Emily and Greg to suggest that the applicant was White and another set of resumes with names such as LaKisha and Jamal to suggest that the applicant was African American. The findings of this study were that while only 5 percent of the companies call back all applicants, Whites to Black call back ratio was 9.19 percent to 6.16 percent respectively, supporting once again that race does in fact influence employment.

The studies focusing on race and employment clearly show that Blacks as compared to Whites have a far more difficult time obtaining a job. I expect to find a similar pattern in this research with whites having a higher chance of post-prison employment than Whites.

Education

Education is another possible predictor on whether or not an individual can obtain employment after incarceration. Usually the more education that one has, the better the job that individual is assumed to be able to obtain. Ex-inmates with education still face problems such as working in fields for which they have been trained. Many inmates face applying for one job and being told to accept jobs of lower positions. Case and Fasenfest (2004) conducted a qualitative study that focused on ex-felons that were a part of a post-incarceration program. This study suggested that the justice system had began to move from punitive justice back to restorative justice because prisons offered educational programs and inmates were allowed to apply for Pell grants, which today is not the case. They found that White males felt that a degree was more beneficial to them than anything else and Black men felt that it was more beneficial to have vocational or trade training. This study included 29 ex-inmates of which 27 were male and 2 were female. The males consisted of 15 Black males and 14 White males. There was only one white male that was unemployed and two-thirds of the black males were employed (p.31). When the white males were asked about the stigma tied to being incarcerated, they usually said that they lost their job for reasons other than their previous record such as a personal characteristic. A great majority of the Black males including ones that had been previously employed said that their employers always found a reason to terminate them without saying it was because of their record. While these types of programs may be beneficial to ex-inmates, they still face barriers even when they are trained to do specific jobs and even earn degrees. In the current study, I examine the relationship between education and post-prison employment. I expect that those inmates with higher levels of education will be more likely to be employed, post-prison, than those with lower levels of education.

Length of Incarceration

Length of time in prison is another predictor of employment that has received empirical attention. Orsagh and Chen (1998) focused on theories that explain the relationship between length of sentence and income. Rational theory suggests that the longer an individual stays incarcerated, their legitimate earnings decrease because of their extended time away from the labor market, and their illegitimate earns increase because they learn how to do more crimes while incarcerated. Another theory that was looked at was Hirshi's (1969) control theory which states that an individual's inclination towards crime weakens the bonds to society. The more time an individual serves and more crime that he commits, the weaker his connection is to family, the community, employers, and legal economic opportunities (p.160). These two theories support the fact that increase in sentence lengths can cause an ex-felon's to have a higher chance of incarceration than at gaining employment. If an ex-felon is released and cannot find a legal job, they will then resort to doing crime and they will be more knowledgeable because of the knowledge gained while incarcerated. If the individual has no connection to society, family, etc. then they will not care about being re-incarcerated. They have less of a reason to be productive and try to obtain legal employment. Based on this research, it is possible however, that those with longer prison sentences are older when they are released from prison and less likely to be influenced by former friends and thus be more likely to get a job.

Religion

The relationship between religious participation and employment post-prison release has received minimal amount of empirical attention. There has been however, considerable examination of the relationship between participation in religious programs while in prison and recidivism. A study by Johnson (2004) focused on whether religious programs have an effect on recidivism. The Bureau of Justice Statistics website points out that "religious activities attract more participants than any other personal enhancement program offered in prison" (Bureau of Justice Statistics, 1991). Religion was categorized into two types: organic religion and intentional/ programmatic religion. Religious practices were among the top programs offered in prisons, along with work, education and vocational training. Organic religion examines the relationship between measures of religiosity and measures of deviance. Organic religion is the examination of the influence or impact of religion on an array of social and behavioral outcomes (Johnson, 2004). Intentional/ programmatic religion is the assessment of the effectiveness of faith-based organizations or interventions (p.330). This includes things such as faith-based drug treatment and spiritual restorative justice programs. The difference between the two is that organic religion is practiced on a day to day basis, while intentional religion entails becoming religious or following religion after an event takes place. Both forms of religion show evidence that they decrease crime; faith-based programs have been associated with a lower recidivism rate for ex-convicts. Having religious aftercare programs can be beneficial to helping individuals remain crime free. Johnson (2004), also points out that the parolees who successfully completed parole; religion was a significant factor in gaining and retaining employment. Religious participation can provide both emotional and social support for a person and thus increase opportunities for employment through the religious network. Religion can also provide socialization into work by emphasizing honesty, motivation and hard work. I expect that respondents who participated in religious programs will have a greater chance of obtaining post-prison employment than those who did not participate.

Incarceration and Future Employment Earnings

Another issue relating to serving a prison sentence and employment is how much money is made in post-prison employment. Although this does not directly address the research question, it does deal with a related set of variables, in that people convicted of a crime, even when they are able to get a job, may be paid less than their counterparts. Western, Kling, and Weiman (2001) conducted a meta-analysis to look at the effect that incarceration has on the labor market. They looked at whether or not being incarcerated had any effect on potential earnings of someone that was previously incarcerated. This study examined variables such as age, education, race, prior work history, as well as criminal record, and found that serving prison time can lower the individual's earnings but not affect whether or not they can get employment. People in white-collar jobs are affected more negatively, because they will have a potential loss anywhere from 10% to 30% (Western, Kling, & Weiman, 2001). They also stated that they could not differentiate the impacts according to racial-ethnic groups. Incarceration does have an effect on whether or not a person will be paid a fair amount of money after incarceration. Former inmates may get employment but may not make enough money to survive. In order to survive, former inmates have to work almost double that of someone that has not been incarcerated; they have to

work more hours and often more jobs in order to maintain for themselves as well as their families.

Western (2002) also examined the impact of wages after incarceration with a life course analysis on whether or not incarceration contributes to the drop in wages after incarceration. This survey was administered to one-quarter of Black non-college incarcerated males, between 1979–1998. Western, (2002) found that the when White, Blacks, and Hispanics were compared using pre-incarceration, post-incarceration, and age, there was only a slight difference in wages. When adding the time served to the model, there was a significant difference between those that had never been incarcerated and those that have. Western states that inmates wage growth is slow and that one day they will get the pay that non-inmate were receiving when they were released, but by the time that happens non-inmates are making much more. While incarceration plays a role in the gap among wages, education is a major factor in this wage gap. Education among Black males during the time of the study was low compared to that of White males. This may be due to the fact that Black males were being incarcerated at much younger ages than their counterparts. Considering that more African Americans were going to prisons instead of schools, the disparity among incarcerated males increased.

Hypotheses

The main function of this research is to examine factors which may influence the likelihood of post-prison employment

I will test the following hypotheses in this research.

1. Inmates that attended church after incarceration are more likely to be employed than inmates that do not. A previous study has shown that ex-inmates that attend religious services are more likely to obtain and maintain employment after incarceration (Johnson, 2004). This is due to the fact that ex-inmates may have morals and values consistent with mainstream society.
2. Race will likely influence employment. The influence of race on employment has been supported by numerous studies. African Americans are less likely to obtain and maintain gainful employment than their White counterparts, adding on a criminal history only intensifies the obstacles faced by this race.
3. Controlling for type of crime committed, those former inmates with higher levels of education will be more likely to get a job than their counterparts. I expect that ex-inmates with higher levels of education will find it easier to obtain employment than those with lower levels of employment. The more time that inmates serve the less likely they are to find employment. Being away from the labor market for extended periods of time can cause the individual to have gaps in work history, lower work ethics, and employers will be less willing to give these individuals employment based on these things.

Methods

The data for this study comes from The Religiousness and Post-Release community Adjustment in the United States, 1990-1998 data set in a study conducted by Melvina T. Sumter (2001). Data were gathered through self-enumerated questionnaires and telephone interviews of

males in 12 prisons in the United States. The official criminal history reports of the males were also used to verify information provided by the respondents. The respondents were given a pre-release questionnaire, and a three-month post-release follow-up phone survey. The response rate is unknown.

Study Design

Sumter (2001) carried out this study by adding official criminal history information to an existing database that was assembled by Clear, Stout, Dammer, Kelly, Shapiro, and Hardyman. Clear et al. (1992) studied the relationship between prisoners' religiousness and adjustment to the correctional setting. Three types of information were gathered by the original research team, through an inmate values and religiousness instrument, a pre-release questionnaire, and a three-month post-release follow-up phone survey. A fourth type of information, official criminal history reports, was added to the original dataset by the principal investigator. The study was based on a quasi-experimental design of two groups of prisoners, a religious group and a non-religious comparison group. In the original data collection, inmates completed a battery of questionnaires about their background characteristics, religious beliefs and activities, and institutional experiences during the last weeks before their release from prison. Within three months after their release, surveys were conducted with inmates who could be reached by telephone. However, the original study contained no measures of post-release criminal behavior. The principal investigator of this study added criminal histories obtained from the Federal Bureau of Investigation for 320 subjects in the original dataset. This dataset also includes a six-year follow-up period, making it possible to assess the relationship between an inmate's religiousness in prison and his post-release community adjustment.

The prisoner values survey collected information on the types of morals they value. An example of this type of question would be whether or not the respondent would do if a friend sold drugs from the cell or if inmates of his race attacked others. The respondents were asked questions about their religious beliefs and practices. The investigators asked whether or not they took part in religious services. The Pre-release questionnaire included what he plans to do as far as employment is concerned, whether or not he would attend church, participate in any types of treatment programs etc. Each inmate was also asked to describe their criminal history and tell investigators if they felt that they could do things as well as others, whether religion was talked about at home, whether they had friends that were religious at home or in jail. The three-month post-release follow-up phone survey collected information on the activities of the inmate after incarceration. The now ex-convict was asked about employment, whether or not they attended church, the types of income that the household was receiving and whether or not they were attending any treatment programs. Official post-release criminal records include information on the offenses the respondent was arrested and incarcerated for, prior arrests and incarcerations, rearrests, outcomes of offenses of rearrests, follow-up period to first rearrest, prison adjustment indicator, self-esteem indicator, time served, and measurements of the respondent's level of religious belief and personal identity.

The sample in the Sumter (2001) study, were given questions about: involvement with church groups, release status and whether they feel that they can solve the problems that they have. When looking at whether or not they were involved in church groups, there were two categories: Yes (13%), and No (87%). Response categories having to deal with the release status of the inmate was broken down into five categories: on parole (62.1%), on probation (14.2%), supervision (17.7%), house arrest (.9%), and other (5%). There were five categories for when the

individual was asked if the agreed that there was no way that they can solve the problems that they have: strongly disagreed (45.6), disagree (17.9%), unsure (8.6%), agree (22.1%), and strongly agree (5.8%)

Independent and Dependant Variables

My independent variables are the number of violent crimes committed, total prior conviction, how far the respondent went in school, race, whether or not the respondent was in a relationship, measured as married and cohabitating verses not, and attend religious services since release. The number of violent crimes committed were broken up into three categories: no violent crimes (62.3%), one violent crime (25.6%) and two or three (12.1%). The total number of prior conviction category was broken down into nine categories, 0 prior convictions (51.9%), 1 prior conviction (32.4%), 2 prior convictions (8.3%), 3 prior convictions (4.9%), 4 prior convictions (4.9%), 5 prior convictions (.9%), 7 prior convictions (.3%), 8 prior convictions (.6%), and 11 prior convictions (.3%). The response categories for how far they went in school were placed into eight categories: never went to school (.7%), some grade school (grades 1-8) (7.7%), completed grades school (8.1%), some of high school (31.3%), finished high school or GED (32.6%), some college (16.5%), completed college (2.4%), postgraduate work or degree (.7%) Race was broken down into three categories: white (38.8%), black (50.9%), and other (8.6%). Whether or not the ex-inmate was currently married and cohabitating versus not were placed into two categories: single (74.8%) and married and living together (25.2%). The amount of times the individual attended church was also broken down into two categories: less than once a week (77%), and once a week or more (23%)

My dependent variable is whether or not ex-inmates were employed. When asked if inmate was employed response category is broken up into two categories: yes (37.4%) and no (62.6%)

Findings

Table 1 presents the correlations, mean and standard deviations for the variables in the model. Getting a job upon release, the dependent variable in this analysis, is significantly positively correlated ($p < .01$) with time served, being married, post-prison program participation and attending religious services.

Table 1. Correlation Table of the variables in the analysis, N=312.

	Mean	Std. Dev.	Employed (1=yes; 0 =no)	Total prior incarceration	Number of violent crimes committed	Time served on this sentence	Number of treatment programs while incarcerated	How far did you go in school	Age	Black	Other	Married/ cohabiting versus not	Attending post-prison Treatment Programs	Attended religious service since release
Employed (1=yes; 0 =no)	.3814	.48651	1											
Total prior incarceration	.83	1.306	-.078	1										
Number of violent crimes committed	.5256	.69863	.004	.128 *	1									
Time served on this sentence	2.08	2.762	.104	.145	.291 ***	1								
Number of treatment programs while incarcerated	3.1058	1.44069	-.016	.018	.008	.084	1							
How far did you go in school	4.50	1.255	.039	.010	-.095	.004	.164 **	1						
Age	28.55	7.433	.027	.339 ***	.116 *	.258	.030	.149 **	1					
Black	.5577	.49746	-.085	-.034	.135 *	.096	-.065	-.165 **	-.043	1				
Other	.0737	.26173	-.070	.000	-.037	-.070	-.080	.024	.014	-.317 ***	1			
Married and cohabiting versus not	.2212	.41569	.122 *	.017	.041	-.043	.036	.163 **	.102	-.085	.027	1		
Attending post-prison Treatment Programs	.2212	.41569	.392 ***	.000	-.036	-.049	.154 **	.114 *	.033	-.179 **	.027	.032	1	
Attended religious services after release	.26	.441	.356 ***	-.038	.051	.162 **	.042	.029	.096	.048	-.113	.085	.331 ***	1

*significant at the .05 level
**significant at the .01 level
***significant at the .001 level

The findings for the logistic regression analysis of the dependent variable, employed post-prison or not employed post-prison are presented in Table 2. Model 1 presents the crime experience variables. Only one variable significantly influences employment. For each year an inmate spends in prison, they are 1.1 times more likely to get a post-prison job (p < .05). Model 2 includes the influence of participation in prison programs which does not have a significant effect upon employment. Years spent in prison continue to be significant (p < .05). Model 3 includes demographic characteristics of the inmate. Years served continues to be significant (p < .05). The other two variables which are significant are race and marital status. Blacks are 44 percent less likely to get a job after prison as compared to whites (p < .05). Married and cohabiting inmates as compared to not married inmates have a 1.8 percent greater chance of getting a job (p < .05). Model 4 presents all of the variables in the analysis. Years in prison remains significant (p < .05). Marital status is also significant with married respondents 1.9 percent more likely to get a job than their counterparts (p < .05). Post-prison release programs also had a significant effect upon employment with those participating in a program having a 6.4 times greater likelihood of getting a job than those not participating in any programs (p < .001).

Finally, regularly attending religious services significantly influences employment (p < .001). Those who attend services are 3.3 times more likely to be employed than those who do not.

Table 2. Logistic regression of control and independent variables on post-prison employment, N=312.

	Model 1		Model 2		Model 3		Model 4	
	B	Exp (B)	B	Exp (B)	B	Exp (B)	B	Exp (B)
Total prior incarceration	-.168	.845	-.168	.846	-.207	.813	-.217	.805
Number of violent Crimes	-.063	.939	-.064	.938	-.049	.952	-.065	.937
Time served on this sentence	.093	1.098 *	.095	1.100 *	.104	1.109 *	.110	1.117 *
Number of treatment programs while incarcerated			-.037	.964	-.073	.930	-.183	.833
How far did you go in school					.009	1.009	-.034	.967
Age					.006	1.006	-.003	.997
Black					-.539	.583 *	-.421	.656
Other					-.913	.401	-.891	.410
Married/ cohabiting versus not					.615	1.850 *	.647	1.910 *
Attending post-prison Treatment Programs							1.887	6.597 ***
Attended religious services after release							1.176	3.243 ***
Constant	-.514		-0.403	.668	-.281		-.332	
Nagelkerke R²	0.28		0.28		.077		0.319	

*significant at the .05 level

**significant at the .01 level

***significant at the .001 level

Discussion

It is important to recognize the barriers and obstacles that an ex-inmate will face upon their release into society. With the incarceration rate being so high, it is inevitable that a great portion of offenders will be released. Upon release, they are expected to become productive members of society. Employment is one of the greatest factors of being productive post-incarceration. In order to find employment, ex-inmates have to deal with the stigma of being incarcerated. These individuals face a variety of obstacles including having to announce to potential employers that they served time, many have limited education, and very little societal support. When determining the factors of whether or not they will recidivate, employment plays a major role.

The predictors examined in this study were age, race education, length of incarceration, and religion. When examining age, my findings show that the older an inmate is when released the more likely the individual is to obtain and maintain employment. This could possibly be because as the inmate matures he begins to value his freedom more and has a higher desire to be a productive citizen and not return to prison. As an inmate gets older, he has a lot more to lose than that of a younger inmate. An older individual may also be able to maintain employment because the employer may feel that he served his sentenced and he is older and more mature and will make better decisions.

The factor of race presented its self in numerous studies. Many of these studies have supported my hypothesis that race does influence employment. Some of the findings in these studies include the fact that a White ex-felon has the same chance of gaining employment as an African American that has never been incarcerated. African Americans were less likely to get call backs from potential employers because of the stigma attached to the image of being African American (Alexander 2010; Bertrand and Mullainathan 2004; Pager 2007; Sumter 2001). Studies have suggested that the media plays a major role in the way that African Americans are perceived and this affects not only potential African American employees that have criminal records but also those that do not. (Pager, 2007) The findings in the current study are consistent with the literature. African Americans are 44 percent less likely to obtain employment when compared to Whites.

Education was not found to be statistically significant in this study. This could be due to the fact that people that have higher education levels return to society and are not able to work in the field in which they are certified. Many states do not allow you to maintain or obtain certain licenses or work at certain jobs if you were convicted of a crime. Those that are allowed to work in their field find it difficult to obtain employment in most cases because they are no longer considered trust-worthy by the people that are in their field. These individuals may obtain employment but it may be a job outside of their field for wages below what they would have acquired, if they were working in their field.

Length of incarceration was found to have a significant effect upon post-prison employment. For every year that an inmate spent in prison, this inmate was 1.1 times more likely to get employment after incarceration. This did not support my hypothesis the more time that inmate serves the less likely they are to find employment. From findings in this study this could be connected to affect of age on employment. Inmates serving longer sentences have a greater likelihood of being older at the time of release than their counterparts. As an inmate gets older, he matures and decides that his freedom and productivity in society is more valuable than the fast rewards that he would obtain from criminal activity. Also, research shows that older people are less likely to commit a crime than younger people (Freeman 2008; Uggen 2008) and that may make the older inmate more attractive to an employer.

Another predictor that was explored was religion. Individuals that participated in and attended religious programs after incarceration had a 6.4 greater likelihood of getting jobs than the individuals that did not attend religious programs. This could be due to the fact that individuals that attended religious services had support from fellow worshipers, or they were able to network with other individuals that were attending these services. This may have given them a greater opportunity to get a job since they knew more people and were considered to be stable due to their religious participation. Also, religious beliefs as a whole are consistent with the norms of overall society and this may increase conformity leading increased job opportunity.

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Limitations

One of the major limitations- of my study was - that women were not included in my research Likewise, the data set that I had access to this was not as current as I would have wanted, from 2001. The focus of this research was to look at employment after incarceration. The questionnaires were only given to male inmates in 12 prisons. This study focused on male incarceration and whether or not religiosity had any effect on their life after prison.

Like many other studies that have been previously done in the criminal justice fields, this study did not include women. If more studies are done with female inmates, it would contribute to the knowledge that we currently have and could also design programs that will not only cater to men but women as well. Information on female ex-convicts would have enhanced this study as it would contribute to the understanding of the patterns and needs of both genders. This study could have compared whether employment is only a problem for males as well as whether females felt that the programs they are offered are beneficial to their integration back into society. This is an area that needs to be looked into because of the increasing number of women that are being incarcerated and the consequent number of children that are affected by the imprisonment of their mothers

The fact that the data set that was used is ten years old, limits the study in some ways... Unfortunately, when looking for data, this study was the only one that was publicly available. While there is up to date data, it is not available to the public because of the sensitive nature of the information and the chance that specific inmates may be able to be identified based on the type of questions included in the survey. This data set also did not have a known response rate which influences whether or not the findings can be generalized to all inmates released from prison

Conclusion

The study findings indicate that the greatest predictor of finding a job after imprisonment is regular religious service attendance and race of the inmate. Although a whole body of research has identified discrimination in the criminal justice system (Alexander, 2010), it is clear that post-release discrimination is also prevalent. Researchers should consider ways to lessen the incarceration stigma of being a former inmate with special focus on race. It important to realize nonetheless, that this is a difficult task because racism is a pervasive part of overall society, especially the criminal justice system.

The Post incarceration religiosity effect holds some promise for policy implications. Encouraging inmates released from prison to attend religious services may reduce the likelihood of recidivism. Religiosity is more than simply attending a church and believing in a higher being. It also represents integration into a group or community and conformity to the norms in particular society. These are factors that would increase the possibility of an employer taking a risk and hiring former inmates.

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Return in Investing in Equity Mutual Funds from 1990 to 2009

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Abstract:

Mutual fund is a financial institution that pools money from many small investors to invest in securities such as stocks, bonds and money market instrument. Actively managed mutual funds are funds that try to outperform a particular benchmark index, such as the S&P 500. Using different financial models such as CAPM, Fama-French 3-Factors model and Carhart 4-Factors Model to evaluate the performance of actively managed mutual funds from 1990 to 2009, this study found that only a small number of funds can actually outperform their benchmarks. Moreover, there are evidences showing that those superior performances are due to luck and not skills. Finally, the study found that there is a significant negative relationship between fund returns and factor measured fund expenses including expenses ratios and fund turnovers.

1/Introduction:

Mutual funds are financial institutions that pool money from many small investors to invest in securities such as stocks, bonds, and money market instruments. Mutual funds provide many benefits to small investors such as better diversification for their portfolios, lower transaction costs and higher liquidity for their assets. In 1970, there were only 361 mutual funds with more than 10 million accounts and 48 billion dollars in asset under management. In 2007, there were 8,726 funds with more than 289 million accounts and more than 10 trillion dollars in asset (Investment Company Institute.)

When an investor looks around for a mutual fund to invest her money, she will encounter two major types of mutual funds: index mutual funds and actively managed mutual funds. An index mutual fund is a fund that aims to deliver to its investors a return of a particular benchmark index such as the S&P 500 Index. Managers of index funds do not need to have any superior stock picking skills, because they only need to build and hold a portfolio that replicates the index they are tracking. A major advantage of an index fund is that it is able to keep its cost low, because managers do not need to spend much money on equity researches or trading cost. On the other hand, an actively managed mutual fund is a fund that actively trades securities in order to earn a return that is higher than the market return. Managers of an actively managed mutual fund generally want to buy winners and sell losers, and they have to spend money to hire security analysts to do equity researches. Thus, an active fund generally incurs a higher expense than an index fund, but its investors also have a chance of beating the market. Naturally, an average investor will be left with two major questions. The first question is whether she should invest in

an index fund that can only earn an average return but has lower cost or in an actively managed mutual fund that has higher cost but may deliver a return higher than the average of the market. Then, if she decides to invest in an actively managed mutual fund with the hope of beating the market, she then will have to choose from a universe of thousands mutual funds. And the second question is whether there is any rule to predict which mutual fund will deliver a higher-than-average return. My study aims to answer those two problems above by using the same methodology as those of Malkiel (1995) along with Fama-French 3-Factors and Carhart 4-Factors models with data from a more recent period, namely from 1990 to 2009.

2/Literature Review:

Jensen (1964) recognized that people could not simply look at returns on their investments to judge whether mutual fund managers had done good jobs. Those mutual funds that earned high returns might take on more risk in their investments by buying risky assets, and there were a high chance that they might go bankrupt in a next period. Therefore, Jensen developed the model that can take into account the risk of the mutual fund portfolios when he computed the returns for those funds. His study included 125 mutual funds from 1945 to 1964, and he found that mutual funds actually could not earn returns high enough to cover their costs. His findings were consistent with the studies of Treynor (1965) and Sharpe (1966).

Using a different approach, Mark Grinblatt and Sheridan Titman (1992) found that mutual fund managers really have abilities to earn abnormal returns, and there is persistence in mutual fund performance. But in 1995, Burton G. Malkiel (1995) pointed out that the study of Grinblatt and Titman suffered from survivorship bias. Survivorship bias occurred in any study that used only a sample of funds that were still in operations and excluded funds that were dead or merged to other funds. Those dead or discontinued funds usually had very poor performances, thus excluding them from a sample would make the performance of the mutual fund industry appeared better than it really was. Then, Malkiel conducted a research that used a sample including both dead and surviving mutual funds from 1971 to 1991. He found that on average mutual funds underperformed their benchmarks both before and after operating expenses. In fact, operating expenses played a very important role in the performance of mutual funds.

Jegadeesh and Titman (1993) found that a strategy of buying winner stocks and selling loser stocks from a previous year can earn significant positive return, and they named it the momentum strategy. Mark M. Carhart (1997) adds the momentum factor discovered by Jegadeesh and Titman (1993) to the Fama-French 3-Factor model in order to come up with the 4-Factors model. Then he uses that model to measure the performance of different portfolios of mutual funds formed on previous year returns. He found that common risk factors in stock returns and operating expenses can explain almost the persistence in mutual fund performance. However, his study cannot explain why there is a strong persistence in inferior performance among the worst segment of the mutual fund industry.

Berk and Green (2004) develop a simple model of actively managed portfolios based on the relationship between fund past performance and fund flow. Their model suggests that the vast majority of funds produce enough returns to cover for their expenses, but the market mechanism of performance chasing has made their superior returns disappear, and thus no persistence can exist. Chen, Hong, Huang and Kubik (2004) found that there is indeed a diseconomies of scale in fund performance, especially in funds that have to invest in small and illiquid stocks, suggesting that the erosion of performance superiority is due to liquidity.

Keith Cuthbertson, Dirk Nitzsche, and Niall O'Sullivan (2006) summarized almost all the researches that have been done in mutual funds performance in their paper, and they found that there were 2%-5% mutual funds that actually earned returns higher than their benchmarks, and 30%-40% mutual funds underperformed their benchmarks. They also found that there was little evidence in the persistence of winning funds, but there were many evidences indicating the persistence among losing funds. All those losing funds tended to have too much operating expenses, portfolio turnovers, and load fees. Thus, they advised investors to hold funds that have low costs, and avoid holding funds that were losing money.

Recently, Fama and French (2010) use bootstrap simulation to measure the performance of actively managed mutual fund. They found that there are evidences of inferior and superior performance when they measure funds' performance using gross returns. However, in term of net return, few funds can actually deliver risk-adjusted returns to investors due to the high cost of active management.

My study analyzes the performing of mutual funds during 1990 through 2009, using Survivor-Bias-Free Mutual Fund Database from Center for Research in Security Prices (CRSP). The third section discusses the dataset I employ and how I arrive at my sample. The fourth section takes a closer look at mutual fund performance by using the CAPM, Fama-French 3-Factors Model and Carhart 4-Factors Model. This study updates the findings of previous studies that mutual fund on average cannot earn excess returns higher than that of the market. In the fifth section, the persistence of mutual fund performance is analyzed, and I also simulate returns from a strategy of buying mutual funds with best performance in past years. The overall finding is that there is no evidence to suggest that past winner would be future winner, but there is evidence that past losers would be future losers. The sixth section discusses the relationship between mutual fund returns and their expenses ratios, management fee and fund turnover. This study found that there is a negative correlation between fund returns and fund expenses ratios, and fund turnovers, and there is a positive correlation between returns and management fee. The conclusion section summarizes the results.

3/ Data:

Survivorship bias is one of the most important problems in evaluating mutual fund performances. It refers to the fact that mutual fund records were used in the past did not include funds that had been liquidated or merged with other funds, referred to as dead funds. Most of the dead funds had very inferior performances, and by extracting them from a dataset, a mutual fund industry would appear better than it actually is. Indeed, Brown, Ibbotson and Ross (1992) found that a sample truncated by survivorship bias can give rise to the appearance of performance persistence. To avoid that problem, I employ the data from The CRSP Mutual Fund Database, which is a survivor-bias-free database originally developed by Mark M. Carhart in 1995, and subsequently updated quarterly since then. The database consists of data about all open-ended mutual funds in the U.S. since 1962. To better evaluate the performance of mutual funds, I limit my research to diversified equity mutual funds, and exclude all the international funds, global funds, sector funds, index funds or enhanced-index funds. To arrive at my sample, I use the Strategic Insight Code and Wiesenberger Code for years before 1999, and Lipper Asset Code and Lipper Objective Code for years after 1999. Specifically, from 1990 to 1992, I select funds that are classified either as GCI, IEQ, LTG, MCG, or SCG by the Wiesenberger Code. From 1992 to 1998, I select funds that are classified either as AGG, FLX, GRI, GRO, ING or SCG by the Strategic Insight Code. Finally, for the year of 1999 to 2009, I remove all the funds that are

institutional funds or funds that are closed to investors to limit the number of funds in my sample. After that, I select funds that are classified either as MCGE, MLGE, SCCE, SCGE, MCCE, LCGE, MCVE, MLCE, SCVE, LCCE, SESE, FX, MLVE, LCVE, or EIEI by the Lipper Objective Code. Moreover, it must be noted that there are many funds that offer multiple class shares (class A, class B, class C, class I…) in order to address the needs of investors whose objectives and investment horizons vary. The returns on different class shares of the same fund are only slightly different due to the difference in expenses and load charges. Because those class shares are recorded as different funds in the CRSP database, I only keep one class share for funds that offer multiple class shares in my sample in order to avoid multiple counting for a same fund.

4/Mutual Fund Performance from 1990 to 2009:

My first research objective is to find out whether an average mutual fund manager can produce excess returns over their benchmarks. It is important to use a benchmark to evaluate the performance of mutual funds, because one cannot judge the quality of a fund just by simply looking at a fund return. In fact, a mutual fund manager can produce high return by taking excessive risks. For example, if two fund managers, A and B, both earned returns of 20 percent on their investments. But then, we knew that manager A had taken an investment that only had 10 percent chance of winning, while manager B had taken the one that had 90 percent of winning. It would be obvious that manager B was a far better one because she earned the same returns with lower risk taken. Thus, it is important to take into account risks in evaluate mutual fund performances. Moreover, suppose that a mutual fund delivers to its investors a 10 percent return, but in that same year, the return of the overall market is 40 percent. It would be hard to say that a mutual fund manager is worth the money investors are paying for, and that is another reason why investors should look at excess returns. In order to compute the risk-adjusted return for a fund, I employ all three models: the Capital Asset Pricing Model (CAPM), the Fama-French Three-Factors Model, and the Carhart Four-Factors Model.

Carhart 4-Factors Model:

Excess Return= $\alpha + \beta 1*(Rm-Rf) + \beta 2*(SMB) + \beta 3*(HML) + \beta 4*(MOM) + \varepsilon$

The Fama-French 3-Factors Model is the Carhart 4-Factors Model without the Momentum factor. The CAPM is the Carhart 4-Factors Model without SMB, HML and MOM. SMB stands for Small-Minus-Big, and it is designed to capture the difference in returns between stocks of small companies and those of big companies. HML is High-Minus-Low, and it is intended to show the difference in returns between value stocks and growth stocks. MOM is momentum factor, which shows the returns coming from the strategy of buying winners and selling losers from previous year. An advantage of the 4-Factors and 3-Factors Model over the CAPM is that those models not only take into account the risk of the market but also the risks by holding firms with small market capitalization, and firms that have high book-to-market value ratios. The momentum factor in the 4-Factors model also controls the returns earned by fund managers by holding stocks that have high returns in the previous periods. The parameter of interest here is a constant (α) in the model, because it is a portion of a fund performance that cannot be explained by the risks taken by a fund manager. Thus, it is supposed to represent a manager's skill. If the constant for a particular fund is not significantly different from zero, then it will indicate that a fund manager's skill in has not added any value to a portfolio's return.

In my study, I evaluate the performance of all diversified equity mutual funds from January 1990 to December 2009. My sample has 3,475 mutual funds, and I require a fund to

have at least 30 monthly observations in order to be included in a sample. Moreover, in order to control for "incubation bias" created by the mutual fund industry, I follow the method of Fama and French (2010) which is only observe the returns of a fund when it passes a particular benchmark of asset under management. The benchmark I use in my study is ten millions in 2009 dollars. If the fund passes a ten million benchmark and then falls back below, it is still included in the sample. I use all three models to compute the alphas for each fund, and then count the number of funds that have significantly positive or significantly negative alphas at the five percent level. If the market efficient hypothesis is true which means that mutual fund performance can be explained by luck, we will expect that about five percent of funds will earn significantly positive risk-adjusted gross return and another five percent earn significantly negative risk-adjusted gross return. Also, fund performance measured by net return must be worse than that measured by gross return. Table 1 displays the summary of alphas measured by all three models. When measured by net return, the average annually alphas measured by all three models are negative which means that funds on average have not been able to produce risk-adjusted returns for their investors. Also, the fact that the average annually alphas decline from CAPM to 3-Factors and then 4-Factors model are expected because the 3-Factors and 4-Factors model are able to control for more risk factors. Moreover, when measured by net return, out of 3475 funds in the sample, only a small number of them have alphas that are positive and statistically significant at the five percent level, but about one-fifth of them have alphas that are negative and statistically significant. For example, using CAPM, 219 out of 3475 mutual funds in a sample have significantly positive alphas at a 5 percent level, and the numbers of funds that produce significant risk-adjusted returns get even smaller when I use the Fama-French 3-Factors model or Carhart 4-Factors model. When measured by gross return, however, a number of funds that earn significantly positive risk-adjusted return are higher than five percent, and the number of funds that earn significantly negative risk-adjusted return is still higher than five percent. And the average annually alpha of all funds in a sample is also positive, indicating that actively managed mutual funds are able to collectively earn a small amount of risk-adjusted return. As a result, the performance of mutual funds measured by gross returns cannot be explained by the efficient market hypothesis. Overall, the evidences show that only a small number of funds are able to produce risk-adjusted returns on their investments, but their abnormal returns are captured by the fund managers in term of fund expenses instead of distributing to investors.

5/The Persistence of Mutual Fund Returns:
My second research objective is to find out whether there is persistence in mutual fund performance, and whether there is a strategy of buying mutual funds that can produce returns higher than that of the value-weighted S&P 500 Index. I use the value-weighted S&P 500 Index as a benchmark for this study because the S&P 500 is the most widely tracked index in the market, and it represents about 70 percent of the stock market. Needless to say, the first index fund was a fund that tracked the return of the S&P 500 Index. In addition, a comparison between actively manage mutual funds and the S&P 500 Index will provide more benefits to investors who are considering whether they should invest in an index fund or an actively managed mutual fund, because the majority of people are indexing their money on the S&P 500 Index.

Table 1

This table shows the summary of mutual fund performances using alphas measured by the CAPM, Fama-French 3-Factors model and Carhart 4-Factors model from January 1990 to December 2009. The sample consists of 3475 equity diversified mutual funds that have at least 30 monthly observations. The number in parentheses is the percentage of funds that have significantly positive or negative alphas at 5 percent level as the total number of funds in the sample.

	Positive and Significant	Negative and Significant	Average Annually Alpha
Net Return			
CAPM	219	505	-0.63%
	(6.30%)	(14.53%)	
3-Factors	143	731	-1.17%
	(4.12%)	(21.04%)	
4-Factors	135	728	-1.23%
	(3.88%)	(20.95%)	
Gross Return			
CAPM	455	212	0.68%
	(13.09%)	(6.10%)	
3-Factors	404	319	0.13%
	(11.63%)	(9.18%)	
4-Factors	409	301	0.07%
	(11.77%)	(8.66%)	

In order to evaluate the persistence in mutual fund performance, I first test if mutual fund who has won in past year can continue to be winner next year. I do the test twice using two different definitions of winners. In the first test, I define a winner as a fund that delivers return higher than a median return of all funds in that year. In the second test, I define a winner as a fund that beats the S&P 500 Index in that year. Second, I form different portfolios made of top performing mutual funds in one year, and see whether those portfolio can earn excess returns over the market next year. The overall finding is that there is no evidence to say that past winners will continue to be future winners, but there is evidence about the persistence of losers. It also implies that the strategy of buying top-performing mutual funds cannot work well for investors.

5.1/ Tests of Persistence of Fund Performance from 1990 to 2009:

In this study, I obtain the sample of all diversified equity mutual funds in each year from 1989 to 2008, computing their excess net return over that of the S&P 500 Index in order to determine winners and losers. And then, I follow those funds to next year to see how many of them will continue to be winners and how many of them will continue to be losers. I also compute the Z-statistics to see whether the percentage of repeated winners and losers are

significantly different from 50 percent. If the percent of repeated winner or loser is significantly different from 50 percent, it will indicate the persistence of fund performance.

Table 2 shows the result when I use Median Return as a benchmark to define winners and losers. A winner is defined as a fund that outperforms a median return of their peers in that year. A loser is a fund that either underperforms a median return or cannot survive until the end of next year. For example, in the period 1989 to 1990, there are 340 funds that earn returns higher than the median of their peers in 1989, and out of those 340 winners, there are 186 funds continue to be earn above-median return of their peers in 1990. As a result, the percent of repeated winner is 54.71 percent, and the Z-statistic indicates that it is significantly different from 50 percent at a 5 percent level. Thus, there is persistence in winner in the period 1989-1990. Similarly, we can also see that there is persistence in loser in the period 1980-1990, because the percent of repeated loser is 58.06 percent and it is significantly different from 50 percent at the 5 percent level. From Table 2, we can see that there are 13 years out of 20 in which past losers would be future losers, and there are 11 years in which past winners would be future winners. The result in table 2 suggests that there are indeed some years that have persistence in winner, but investors must remain cautious when making a decision to invest in past winners for several reasons. First, winners in table 2 are funds that beat the median return of their peers, and it may happen that the median return of actively manage mutual funds in a sample is lower than the return of the market. For that reason, the fact that a fund can continuously beat the average returns of their peers does not guarantee that a fund is a better choice than an index fund that deliver market returns. Second, although the persistence in winner is strong in 1990s and the first half of 2000s, it completely disappears in recent years. In fact, from 2005 to 2009, winners in one period tend to be losers in the next period and vice versa. Therefore, going forward, investors cannot know with certainty whether the persistence in winner will continue to persist in order to take advantage of it.

Table 2
Test of Persistence of Fund Performance from 1990 to 2009: Using median excess return as a benchmark to define winner and loser.
This table presents two-way tables of ranked total returns over one-year intervals. Years when there is persistence in winner are highlighted in green. Years when there is persistence in losers are highlighted in yellow. The returns that are used are net returns.

Initial Year		Next Year		Percent of Repeated Winner/Loser	Z-Test Repeat Winner/Loser
		Winner	Loser		
1989	Winner	186	154	54.71%	1.74
	Loser	143	198	58.06%	2.98
1990	Winner	131	118	52.61%	0.82
	Loser	115	135	54.00%	1.26
1991	Winner	169	178	48.70%	-0.48
	Loser	170	178	51.15%	0.43

1992	Winner	270	136	66.50%	6.65
	Loser	128	279	68.55%	7.48
1993	Winner	226	222	50.45%	0.19
	Loser	207	242	53.90%	1.65
1994	Winner	286	241	54.27%	1.96
	Loser	223	304	57.69%	3.53
1995	Winner	322	258	55.52%	2.66
	Loser	230	350	60.34%	4.98
1996	Winner	405	231	63.68%	6.90
	Loser	213	424	66.56%	8.36
1997	Winner	406	315	56.31%	3.39
	Loser	291	430	59.64%	5.18
1998	Winner	539	265	67.04%	9.66
	Loser	265	540	67.08%	9.69
1999	Winner	248	603	29.14%	-12.17
	Loser	552	299	35.14%	-8.67
2000	Winner	650	240	73.03%	13.74
	Loser	185	705	79.21%	17.43
2001	Winner	700	262	72.77%	14.12
	Loser	221	741	77.03%	16.77
2002	Winner	429	567	43.07%	-4.37
	Loser	505	492	49.35%	-0.41
2003	Winner	646	354	64.60%	9.23
	Loser	319	681	68.10%	11.45
2004	Winner	625	372	62.69%	8.01
	Loser	322	675	67.70%	11.18
2005	Winner	489	500	49.44%	-0.35
	Loser	438	551	55.71%	3.59

		Winner	Loser		
2006	Winner	305	632	32.55%	-10.68
	Loser	567	371	39.55%	-6.40
2007	Winner	358	618	36.68%	-8.32
	Loser	557	415	42.70%	-4.55
2008	Winner	281	654	30.05%	-12.20
	Loser	551	384	41.07%	-5.46

Table 3 shows the result when I use positive excess return over the S&P 500 Index as benchmark to define winners and losers. A winner is a fund that outperforms the S&P 500 Index in that year, and a loser is a fund that either underperforms the S&P 500 Index or cannot survive until the end of next year. For example, in the period 1989-1990, there are 122 funds that beat the S&P 500 Index in 1989, and 62 out of 122 funds continue to beat the index in 1990. The percent of repeated winner is 50.82 percent, but the Z-statistic indicates that it is not significantly different from 50 percent. Thus, there is no evidence for the persistence of winner in the period 1989-1990, but there is evidence for the persistence in loser as percent of repeated losers is significantly different from 50 percent at the 5 percent level. From Table 3, we can see that there are 15 years in which there is persistence in losers and there are 6 years in which there is persistence in winners. Table 3, thus, is more helpful for an investor who is thinking about investing in an index fund. The findings imply that if an investor picks a fund that has beaten the S&P 500 Index in that year to invest, her chance of beating the S&P 500 Index in the next year will be significantly lower than 50 percent in most cases. Furthermore, if she picks a fund that is beaten by the market to invest, hoping that the fund will turn around, she will more likely to earn a return that is lower than the market next year. For that reason, investors should not invest their money to funds that are beaten by the market because the odd is not in their favors.

Table 3
Test of Persistence of Fund Performance from 1990 to 2009: Using positive excess return over the S&P 500 as a benchmark to define winner and loser
This table presents two-way tables of ranked total excess returns over the S&P 500 over one-year intervals. Years when there is persistence in winners are highlighted in green. Years when there is persistence in losers are highlighted in yellow. The returns that are used are net returns.

Initial Year		Next Year		Percent of Repeated Winner/Loser	Z-Test Repeat Winner/Loser
		Winner	Loser		
1989	Winner	62	60	50.82%	0.18
	Loser	187	372	66.55%	7.82
1990	Winner	90	86	51.14%	0.30
	Loser	146	177	54.80%	1.72
1991	Winner	179	181	49.72%	-0.11

	Loser	172	163	48.66%	-0.49
1992	Winner	326	100	76.53%	10.95
	Loser	174	213	55.04%	1.98
1993	Winner	115	445	20.54%	-13.95
	Loser	57	280	83.09%	12.15
1994	Winner	46	176	20.72%	-8.73
	Loser	96	736	88.46%	22.19
1995	Winner	50	126	28.41%	-5.73
	Loser	162	822	83.54%	21.04
1996	Winner	41	234	14.91%	-11.64
	Loser	71	927	92.89%	27.10
1997	Winner	37	99	27.21%	-5.32
	Loser	183	1123	85.99%	26.01
1998	Winner	222	43	83.77%	11.00
	Loser	497	847	63.02%	9.55
1999	Winner	347	425	44.95%	-2.81
	Loser	712	218	23.44%	-16.20
2000	Winner	798	385	67.46%	12.01
	Loser	118	479	80.23%	14.77
2001	Winner	704	325	68.42%	11.81
	Loser	146	749	83.69%	20.16
2002	Winner	482	477	50.26%	0.16
	Loser	574	460	44.49%	-3.55
2003	Winner	746	383	66.08%	10.80
	Loser	288	583	66.93%	10.00
2004	Winner	780	305	71.89%	14.42
	Loser	389	520	57.21%	4.34
2005	Winner	345	892	27.89%	-15.55
	Loser	200	541	73.01%	12.53

2006	Winner	199	394	33.56%	-8.01
	Loser	733	549	42.82%	-5.14
2007	Winner	287	739	27.97%	-14.11
	Loser	422	495	53.98%	2.41
2008	Winner	323	423	43.30%	-3.66
	Loser	778	346	30.78%	-12.89

5.2/Returns from Strategy involving the Purchase of Top Performing Funds:

In this study, I want to test whether the strategy of buying funds with top performance in the past will allow an investor to earn substantial returns in the future. In the first test, at the beginning of each year, I rank all the funds from highest to lowest in term of its excess return over the S&P 500. And then, I see how much an investor can earn by purchasing the top 10, 20, 30 and 40 funds, assuming that there is no switching cost. For example, in 1990, I purchase the top 10 funds in 1989 and hold them for one year. Then, in 1991, I would sell those funds and switch to the top 10 funds in 1990. In the real world, investors may have to pay load charges or taxes when they buy and sell their fund shares, but in this study, I assume that there is no switching cost for the sake of simplicity. As being shown in table 2, there are some years that have persistence in winners in mutual fund performance. As a result, this study aims to test whether an average investor can earn abnormal return by taking advantage of that short-run persistence. Table 4 shows the return from purchasing funds with top one-year performance. We can see that this strategy allow an investors to beat the market in the 1990s in term of five-years average return, but it fails to beat the market in 2000s. Overall, this strategy allows an investor to earn positive excess return over that of the market 10 years out of 20. Thus, the probability of winning is just equal 50 percent, and it may happen simply by chance. Furthermore, although the strategy works very well in 1990s, it fails to work in 2000s, especially in those most recent years. That fact suggests that it is not an answer for investors who are looking for a dependable strategy that can work over time.

In the second test, I identify the top twenty mutual funds in term of annually excess return over the S&P 500 during 10 years from 1990 to 1999, and then I see how those funds would perform in the next ten years. The purpose of this test is to investigate whether there is a long-run persistence in mutual fund performance. Table 5.1 shows the result of this strategy. Out of 20 funds, 7 died and only 2 of the remaining earned positive excess returns during the next ten years. Their rankings in the next ten years also fall dramatically, indicating that this is not a strategy which investors should follow.

Table 4

Simulated Annual Returns – Strategy of Buying Mutual Funds with Best One-Year Performance

This table simulates the excess returns over the S&P 500 that would have earned by investors over various years from 1990 to 2009 from buying funds with the best performance over the past year. In calculating the excess returns, when a fund that is chosen dies in the next year, the return of the market is used as a substitution. The return of the S&P 500 is also provided as a reference to compute the net return earned by investor. The returns that are used are net returns.

Year	Top 10	Top 20	Top 30	Top 40	S&P 500_VW
1990	-8.81%	-4.09%	-3.50%	-2.56%	-3.19%
1991	15.36%	12.56%	10.21%	10.79%	30.67%
1992	3.59%	1.30%	0.90%	0.44%	7.72%
1993	12.37%	11.45%	11.08%	10.39%	9.89%
1994	-0.65%	-0.37%	-1.57%	-1.46%	1.36%
Average	4.00%	3.96%	3.25%	3.36%	8.70%
1995	3.04%	0.13%	-1.31%	-2.24%	37.66%
1996	-12.18%	-7.22%	-6.61%	-6.39%	23.22%
1997	-9.29%	-7.68%	-7.17%	-7.40%	33.61%
1998	-12.12%	-9.28%	-9.03%	-9.56%	29.30%
1999	70.14%	58.05%	52.26%	44.07%	21.35%
Average	4.18%	4.22%	3.46%	2.00%	28.88%
2000	-25.40%	-17.91%	-17.90%	-16.26%	-8.35%
2001	30.63%	33.47%	30.37%	28.35%	-11.90%
2002	11.86%	10.23%	12.31%	11.55%	-21.78%
2003	-50.86%	-36.50%	-25.36%	-16.54%	28.70%
2004	6.55%	5.48%	5.15%	5.76%	10.98%
Average	-10.61%	-4.15%	-1.16%	1.14%	-2.04%
2005	1.99%	4.09%	4.14%	4.61%	5.22%
2006	-2.44%	-2.82%	-3.34%	-3.61%	15.67%
2007	-4.41%	-3.52%	-3.28%	-2.99%	5.75%
2008	-15.20%	-15.24%	-18.16%	-17.40%	-36.46%
2009	-24.60%	-17.42%	-13.39%	-12.40%	26.48%
Average	-9.47%	-7.34%	-7.15%	-6.68%	0.68%

Moreover, I also test the strategy of purchasing the top twenty mutual funds in term of alphas estimated by the Carhart 4-Factors model. Table 5.2 shows the returns earned by investors during the next ten years if they invest in the top twenty mutual funds that have highest alphas. The average alpha of those twenty funds from 1990 to 1999 is 5.13 percent, and it falls to 0.96 percent from 2000 to 2009. Those top funds also suffer a big fall in their rankings in the next ten years, although their average alpha is still positive. Table 5.3 shows the returns earned by investors during the next ten years if they invested in the top twenty mutual funds that have alphas that are positive and statistically significant. During the next ten years, although some of them still earn positive alphas, most of those statistically significant alphas from past period disappear, meaning that those positive alphas are indifferent from zero in the next ten years. Their average ten-years annually returns also fall greatly from 18.28 percent to 2.14 percent. Whether the decline of those alphas is due to the efficiency of the market, meaning mutual fund managers are lucky in one period and unlucky in the next, or due to the market mechanism of investors chasing alphas suggested by Berk and Green (2004) is unclear, but both of the tables show that those high alphas earned by funds in the past are not sustainable in the future.

Table 5.1
Subsequent 2000 to 2009 Performance of Top Twenty Diversified Mutual Funds from the 1990 to 1999 Period
This table shows the excess returns earned over the S&P 500 during the 2000s on the 20 diversified mutual funds with the best returns during the 1990s. Highlighted funds are funds that no longer exist at the end of 2009, thus they do not have a rank. The returns that are used are net returns.

	1990-1999		2000-2009	
Fund Name	**Rank**	**Annually Excess Returns**	**Rank**	**Annually Excess Returns**
RS Investment Trust: RS Emerging Growth Fund	1	9.52%	1116	-4.25%
Spectra Fund, Inc.	2	9.25%	931	-0.94%
Van Kampen Emerging Growth Fund, Inc.	3	8.78%	#N/A	-5.79%
Janus Investment Fund: Janus Twenty Fund	4	7.71%	976	-1.46%
MFS Series Trust II: MFS Emerging Growth Fund	5	6.31%	1101	-3.69%
United New Concepts Fund, Inc.	6	5.89%	707	1.14%
The Managers Funds: Managers Capital Appreciation Fund	7	5.83%	1144	-6.57%
American Century Mutual Funds, Inc.: Ultra Fund	8	5.73%	1041	-2.85%
Putnam OTC & Emerging Growth Fund	9	5.69%	#N/A	-12.72%
Fidelity Advisor Series I: Fidelity Advisor Equity Growth Fund	10	5.33%	1049	-2.76%
INVESCO Stock Funds Inc.: INVESCO Dynamics Fund	11	5.30%	1038	-1.97%
Harbor Fund: Harbor Capital Appreciation Fund	12	5.20%	971	-1.54%
Fidelity Mt. Vernon Street Trust: Fidelity Growth Company Fund	13	5.06%	835	0.22%
The PBHG Funds, Inc.: PBHG Growth Fund	14	4.86%	#N/A	-4.42%
Wells Fargo Funds Trust: Large Company Growth Fund	15	4.82%	1028	-2.28%
Janus Investment Fund: Janus Venture Fund	16	4.79%	1040	-2.10%
Nicholas-Applegate Institutional Funds: Mid Cap Growth Fund	17	4.60%	#N/A	-11.00%
Pilgrim Mutual Funds Trust: Mid Cap Growth Fund	18	4.58%	#N/A	-11.00%
AIM Equity Funds, Inc.: AIM Aggressive Growth Fund	19	4.46%	#N/A	-0.36%
IDEX Series Fund: IDEX JCC Growth Portfolio	20	4.41%	#N/A	-7.70%
Average Excess Returns of 20 Funds		**5.91%**		**-4.10%**
S&P 500 Average Return		18.36%		-0.69%
No. of funds with 10-year record		714		1162

Finally, I test for the strategy of purchasing funds with high betas predicted by the CAPM models by regress the average annually returns of funds to their betas. The slope coefficient of that regression is almost flat, suggesting that there is a very low correlation between a fund's return and its beta. This result is consistent with that of Malkiel (1995). All the evidence in this section suggests that buying mutual funds that had good past records is not a dependable strategy for investors either in the short-run or in the long-run.

Table 5.2

Subsequent 2000 to 2009 Performance of Top Twenty Mutual Funds ranked by Alpha from the 1990 to 1999 Period

This table shows the Alpha measured during the 2000s on the 20 mutual funds that have highest alpha estimated by the Carhart 4-Factors Model. Highlighted fund is a fund that no longer exists at the end of 2009. The returns that are used are net returns.

	1990-1999		2000-2009	
Fund Name	Rank	Fund Annually Alpha (%)	Rank	Fund Annually Alpha (%)
Franklin Custodian Funds, Inc.: Growth Series; Class A Share	1	14.52	383	1.128
RS Investment Trust: RS Emerging Growth Fund	2	6.372	1061	-2.928
United New Concepts Fund, Inc.; Class A Shares	3	6.324	707	-0.468
Berger Omni Investment Trust: Berger Small Cap Value Fund; I	4	5.328	90	3.84
Vanguard PRIMECAP Fund	5	5.16	122	3.132
Weitz Series Fund, Inc.: Value Portfolio	6	5.124	1074	-3.12
MFS Series Trust II: MFS Emerging Growth Fund; Class B Share	7	4.992	604	0.516
Fidelity Advisor Series I: Fidelity Advisor Equity Growth Fu	8	4.932	601	-1.896
Fidelity Puritan Trust: Fidelity Low-Priced Stock Fund	9	4.584	49	5.04
Wells Fargo Funds Trust: Large Company Growth Fund; Class A	10	4.512	766	-0.768
FPA Capital Fund, Inc.	11	4.44	21	5.76
INVESCO Stock Funds Inc.: INVESCO Dynamics Fund	12	4.272	629	-0.132
Mairs & Power Growth Fund, Inc.	13	4.272	235	2.028
Merrill Lynch Phoenix Fund, Inc.; Class A Shares	14	4.248	229	2.1
WM Trust I: Northwest Fund; Class A Shares	15	3.984	199	2.364
AIM Equity Funds, Inc.: AIM Aggressive Growth Fund; Class A	16	3.972	927	-1.656
Strong Common Stock Fund, Inc.	17	3.96	193	2.412
Oppenheimer Main Street Funds, Inc.: Oppenheimer Main Street	18	3.948	828	-1.104
UAM Funds, Inc.: ICM Small Company Portfolio; Institutional	19	3.9	284	1.62
Longleaf Partners Funds Trust: Longleaf Partners Fund	20	3.72	371	1.164
Average Annually Alpha (%)		5.1282		0.9516
Average Annually Alpha of Funds in the Sample (%)				0.1482
No. of Funds with 10-Year Records in the Sample	714		1162	

Table 5.3

Subsequent 2000 to 2009 Performance of Top Twenty Mutual Funds that have positive and significant Alphas from the 1990 to 1999 Period

This table shows the Alphas measured during the 2000s on the 20 mutual that have positive and significant alpha estimated by the 4-Factors Model. Out of 714 funds that have 10-year track record, there are exactly 20 funds that have positive and significant alphas. The returns that are used are net returns.

Fund_Name	1990-1999		2000-2009	
	Fund Annually Alpha (%)	Fund Average Annually Net Return	Fund Annually Alpha (%)	Fund Average Annually Net Return
United New Concepts Fund, Inc.	6.324	24.80%	-0.468	0.35%
Vanguard PRIMECAP Fund	5.16	21.84%	3.132	3.23%
Weitz Series Fund, Inc.: Value Portfolio	5.124	18.13%	-3.12	1.75%
Fidelity Advisor Series I: Fidelity Advisor Equity Growth Fund	4.932	24.21%	-1.896	-3.71%
Fidelity Puritan Trust: Fidelity Low-Priced Stock Fund	4.584	17.48%	5.04	11.04%
Wells Fargo Funds Trust: Large Company Growth Fund	4.512	23.59%	-0.768	-3.30%
Mairs & Power Growth Fund, Inc.	4.272	18.34%	2.028	6.91%
Merrill Lynch Phoenix Fund, Inc.	4.248	15.96%	2.1	2.89%
Strong Common Stock Fund, Inc.	3.96	21.59%	2.412	4.56%
Oppenheimer Main Street Funds, Inc.	3.948	22.58%	-1.104	-0.82%
UAM Funds, Inc.: ICM Small Company Portfolio	3.9	16.19%	1.62	9.70%
The Merger Fund	3.504	10.52%	1.5	4.66%
T. Rowe Price Capital Appreciation Fund	3.288	11.50%	4.692	9.28%
Liberty Funds Trust III: Crabbe Huson Equity Fund	3.264	13.25%	6.78	-7.52%
MFS Series Trust VII: MFS Capital Opportunities Fund	3.216	20.20%	-3.288	-1.13%
Oppenheimer Quest For Value Funds	2.976	16.15%	1.344	3.10%
T. Rowe Price Equity Income Fund	2.832	14.14%	0.576	4.13%
GMO Trust: GMO Growth Fund; Class III Shares	2.808	20.89%	-0.396	-3.33%
Prudential Equity Fund, Inc.; Class A Shares	2.772	15.50%	2.88	2.14%
Frank Russell Investment Company: Equity Q Fund	0.816	18.68%	-0.876	-1.16%
Average Annually Alpha of 20 funds (%)	3.822		1.1094	
Average Annually Return of 20 funds (%)		18.28%		2.14%

6/ The Analysis of Expenses Ratios:

Expenses ratio is the ratio between the fund expenses and its asset under management. A fund's expenses include the money it has to pay for its management company and to advertise the fund to attract new investors. Indeed, mutual fund expenses play a very important role in a fund's performance. In fact, high expenses ratios will consume all the abnormal risk-adjusted returns a fund has earned on its investments. As being shown in section IV, mutual fund performances look better when we measure by gross returns instead of net returns. Malkiel (1995) reported that there is a negative relationship between a fund's total expenses ratio and its performance. However, when expenses ratio is divided into advisory and non-advisory expenses, his study found a negative relationship between non-advisory expenses and fund returns but a positive relationship between advisory and returns. But he noted that a positive relationship might due to incentive feature mutual fund offers to its management company. For example, if a fund has a good year, it will increase its advisory expenses as a bonus to its management company, leading to a positive relationship between advisory expenses and returns.

Mutual fund's turnover measures how often the portfolio manager trades securities in his or her portfolio. On one hand, a high portfolio turnover will result in high trading costs and lower returns on a portfolio. However, mutual fund manager can argue that a high turnover will lead to high returns because a fund will execute a trade only when an expected return is higher than the trading cost.

This section looks at the relationship between mutual fund returns and their expenses ratios and their turnovers. Table 6 shows the regression results of a fund's average annual returns on its expenses ratios. Consistent with the Malkiel's study in 1995, this study found that a one percent increases in total expense ratios decreases a fund net return by 1.95 percent, and a fund gross return by 0.95 percent. When expenses ratio is divided into management fee and other fees, this study also found a positive relationship between management fee and returns but a negative relationship between other fees and returns. It must be noted that a positive relationship between management fee and net return is not significantly different from zero in net return, but a negative relationship between other fees and returns are statistically significant in both net and gross returns. A negative relationship is expected because there is no reason to think that a fund's non-advisory fee, such as advertising expenses, can lead to higher returns for its investors. Furthermore, when controlled for fund turnovers, this study found that both fund turnovers and other fees have a significantly negative relationship with returns measured in both net and gross returns. Management fee is found to have a positive relationship with a fund's returns. Specifically, a one percent increase in management fee will lead to .54 percent increase in a fund's net return and 1.6 percent increase in gross returns. Thus, the results of this study suggest that fund management fee can lead to an increase in fund performance, but fund turnover and non-advisory expenses can have significantly negative impacts on fund performance.

Table 6
Regression of Average Annual Returns on Average Annual Expense Ratios
This table shows coefficients and standard errors of regressions where the dependent variable was average annual returns, and independent variables were either total expenses or management fee and other fees. "Other fees" is the difference between total expenses and management fee. There are 3055 funds in the sample that has information about Management Fee, and Fund Turnover. When a fund's Expenses Ratios, Management Fee or Turnover are missing, the average value of that fund is used as a substitution. The t-statistics to test whether the parameter is statistically significant is put in parentheses.

	Total Expense Ratio	Management Fee	Other Fees	Fund-Turnover	R-Squared
Net Return	-1.95				0.0541
	(-11.1)				
		0.16	-3		0.1
		(0.66)	(-15.28)		
		0.54	-2.69	-0.61	0.12
		(2.13)	(-13.45)	(-5.98)	
Gross Return	-0.95				0.01
	(-5.36)				
		1.23	-2.04		0.06
		(4.92)	(-10.12)		
		1.6	-1.72	-0.61	0.08
		(6.12)	(-8.42)	(-5.8)	

7/Conclusion:

In conclusion, my study has confirmed the findings of previous works that the majority of mutual funds fail to beat the market average, and there is no dependable rule to predict winner funds. Indeed, only a small number of funds can earn significantly positive risk-adjusted returns in their investments, and fewer of them can deliver those risk-adjusted returns to their investors because expense ratios have eaten up most of their abnormal returns. This study also found that there are some funds that can actually have abilities to earn abnormal returns for investors. Once again, strategies of buying funds that have good past performance fail to be a dependable strategy for investors in both short-run and long-run. In fact, there are some years that have persistence in winners but there is no evidence that investors can take advantage of that short-run persistence. In addition, there are strong evidences that loser funds will likely to be losers. Moreover, management fee is found to have a positive relationship with fund returns, but total expense ratios and fund turnovers are found to have a strong negative relationship with fund returns. The implication for investors in mutual funds is to avoid funds that have poor past records and funds that have high expenditures in non-advisory expenses and high portfolio turnovers. For an average investor, putting her money into an index fund is a right strategy.

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The Role of NS5A RNA Binding Activity in Hepatitis C Virus Replication

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Abstract

Approximately 2% of the world's population is infected by hepatitis C virus (HCV), for which there is no vaccine. HCV nonstructural protein 5A (NS5A), shown by the Cameron laboratory to specifically bind RNA, is a target of new drug development against the virus. We have made amino acid substitutions within regions of NS5A shown to be involved in RNA binding to better understand the function of this interaction. This project explores the impact of these substitutions using biochemical and cell culture-based assays to determine the role of NS5A RNA binding activity in HCV replication.

Introduction

Hepatitis C Virus (HCV) infects about 3% of the world's population and can lead to liver cirrhosis, liver cancer, and ultimately death. HCV is transmitted through the blood and, in some rare cases, can be passed to unborn children from infected mothers. There is no vaccine available against HCV, and current treatments combining the nucleoside analogues interferon and ribavirin are not only expensive, but are also effective in only 50% of cases[1]. These treatments were developed to inhibit virus activity using specific RNA sequences. However, viral RNA polymerase is prone to errors leading to multiple genetic forms of the same virus, making this treatment strategy ineffective in many cases[1]. A different approach to developing treatments is to target the HCV proteins needed for viral genome replication.
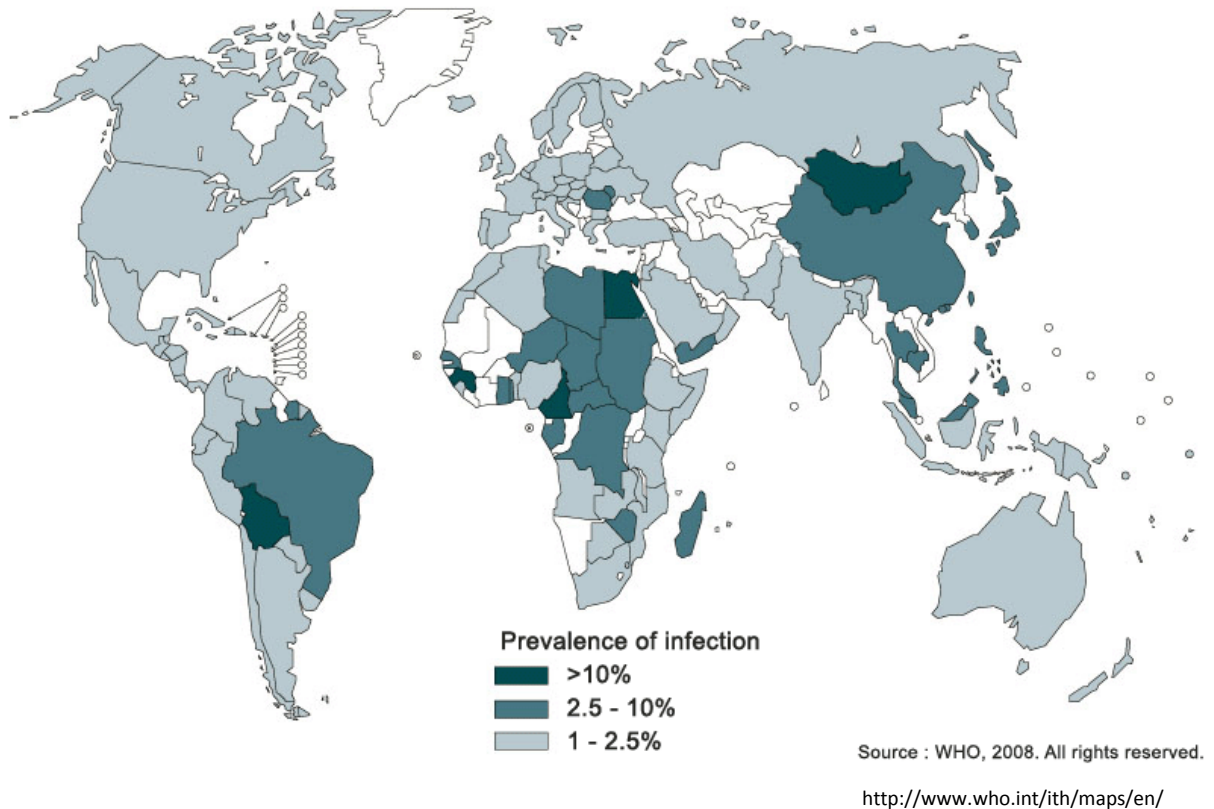
Figure 1. HCV is a global health concern. The map shows the prevalence of infection of HCV around the world.
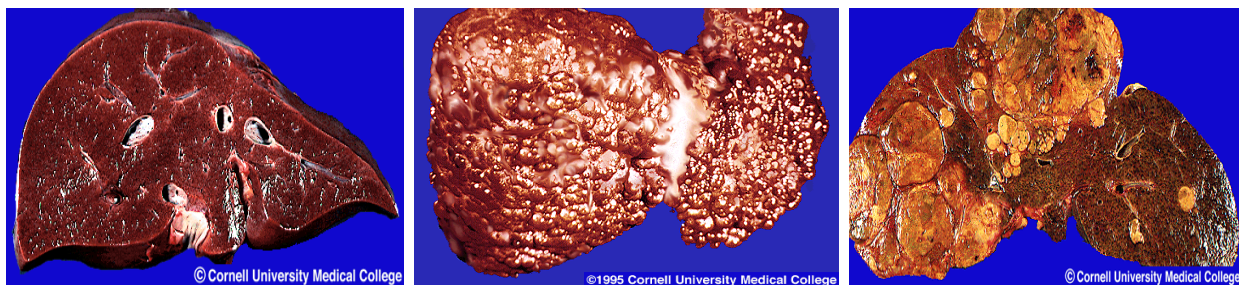
Figure 2. HCV affects the liver (left). HCV can cause liver cirrhosis (center) or liver cancer (right).

viruses contain RNA as their genetic material that can be translated directly into protein. In contrast, negative sense RNA viruses must first convert their negative sense RNA into positive sense RNA before making protein. HCV targets liver cells for infection. In order for HCV to replicate, it must bind to a cell's outer membrane and then enter the cell in a process known as endocytosis. Once inside the cell, the virus releases its RNA, which moves to ribosomes that are responsible for translation[2]. Once there, RNA can use the host cell's machinery to translate its RNA into protein. The new viral proteins either make up the structure of the virus or are used for other functions, such as aiding with genome replication[2]. Using its RNA as a template, the virus makes many copies of its own RNA, which is then packaged and assembled into new viruses using the newly formed proteins. These new viruses are transported out of the cell in order to spread to other cells and repeat the process[2]. In this way, viruses can spread throughout the body in a short period of time.

The HCV genome encodes many proteins: structural proteins make up the virus protein coat and nonstructural proteins are responsible for genome replication. The nonstructural (NS) proteins, NS2, NS3, NS4A, NS4B, NS5A, and NS5B, play various roles in the function of HCV. The protein examined in this study is NS5A. NS5A is a multifunctional protein separated into three domains and two linker regions. It is capable of interacting with cellular and viral factors, including viral RNA, and participates in cell signaling pathways that may promote HCV replication.
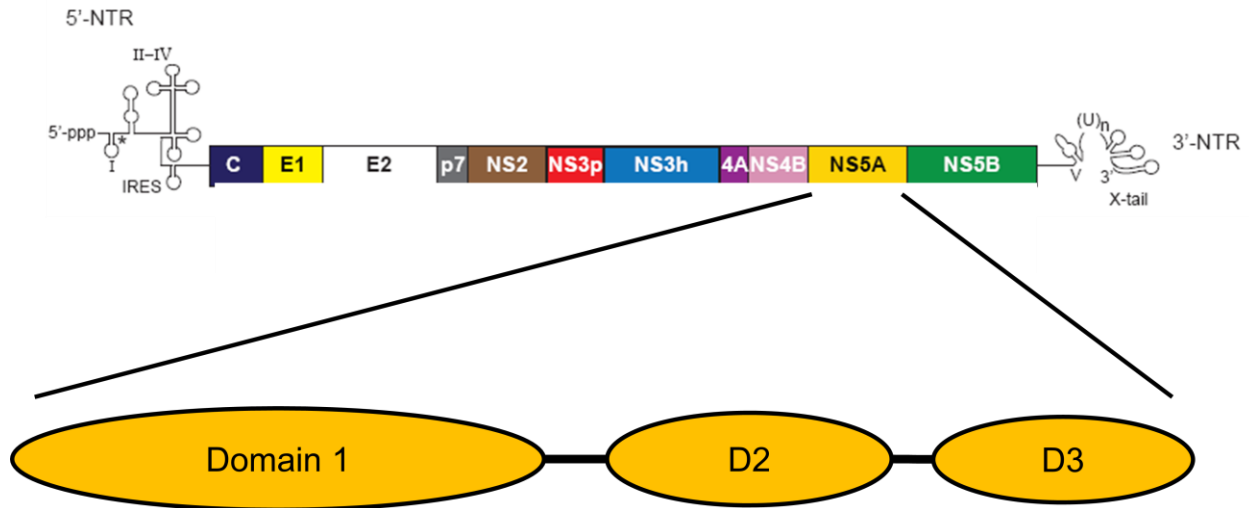
Figure 3. HCV encodes multiple proteins, structural and non-structural. Nonstructural protein 5A is the focus of this study.

protein that may alter protein structure and function. NS5A can exist in three forms: unphosphorylated, basally phosphorylated, and hyperphosphorylated. The phosphorylation of NS5A occurs at various sites within the protein, though one site in particular, the amino acid serine (S) at residue 2204, is an important site of phosphorylation. Phosphorylation at this site is necessary for NS5A to reach its hyperphosphorylated form. It has been shown that an adaptive mutation that changes the serine to an isoleucine (I) allows the virus to replicate in cells, though the mechanism behind this adaptation remains undefined.

Domain 1 of NS5A has been shown to be capable of binding RNA, in particular uracil (U) and by inference, guanine (G) nucleotides. Based on analysis of NS5A structure, it is known that NS5A can form a dimer, two NS5A molecules joined in a two-protein complex[3]. This conformation is optimal for RNA binding because this new structure creates a groove where RNA can be held while it interacts with NS5A[3].
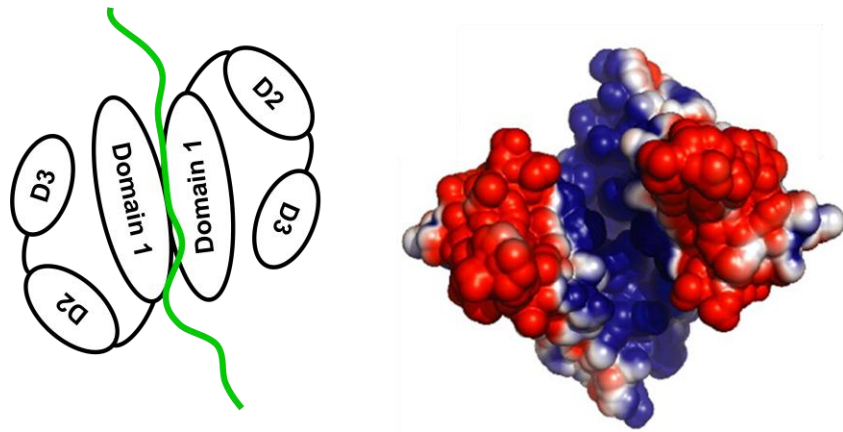
Figure 4. Domain 1 of NS5A forms a dimer which contains a groove sufficient for binding RNA.

2176 TDPSHI**TAETAKRRLA**RGSPPSLASSSASQLSAPSL 2211

90°
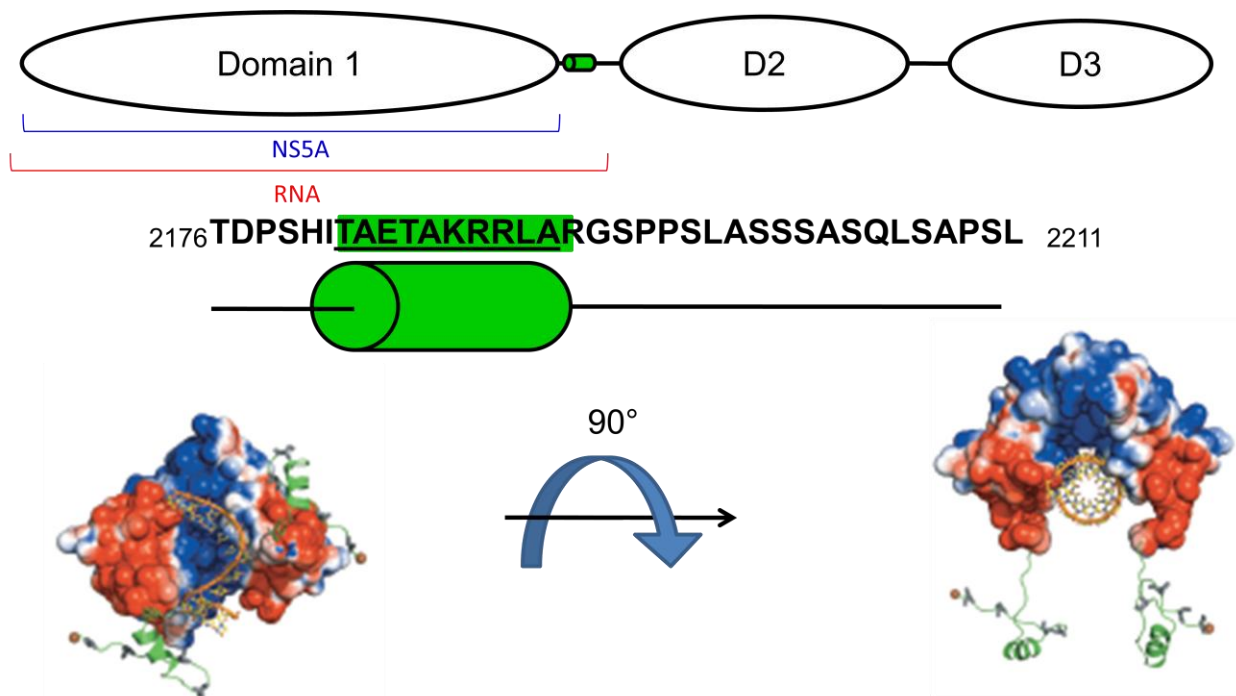
Figure 5. The helix within the linker region between domains 1 and 2 may play a role in NS5A binding activity.

plus. This small helix has been thought to be important for RNA binding because of a few positively charged amino acids: a lysine (K) and two arginine (R) residues at positions 2187, 2188, and 2189. Because domain 1 plus of NS5A is the optimal RNA binding domain, these residues could play a role in HCV genome replication[4].

Previous data analyzing RNA binding activity using fluorescent polarization was done with rU15 and rA15 and NS5A domain 1 plus. For rU15, the RNA binding activity was lower in the KRR-DDD protein when compared to wild type, as shown by the higher dissociation constant (K_d) value. For rA15 the K_d values between wild type and the mutant are similar (Figure 6). A difference in rU15 binding suggests that these residues in domain 1 plus play a role in specific binding of RNA to NS5A.

This project aims to address the importance of K2187, R2187, and R2189 in HCV genome replication through cell culture techniques.

rU15   rA15

	wt	K2187D, R2188D, R2189D		wt	K2187D, R2188D, R2189D
K_d (nM)	42.23 ± 5.5	96.06 ± 5.2		440.6 ± 31.8	412.7 ± 12.7
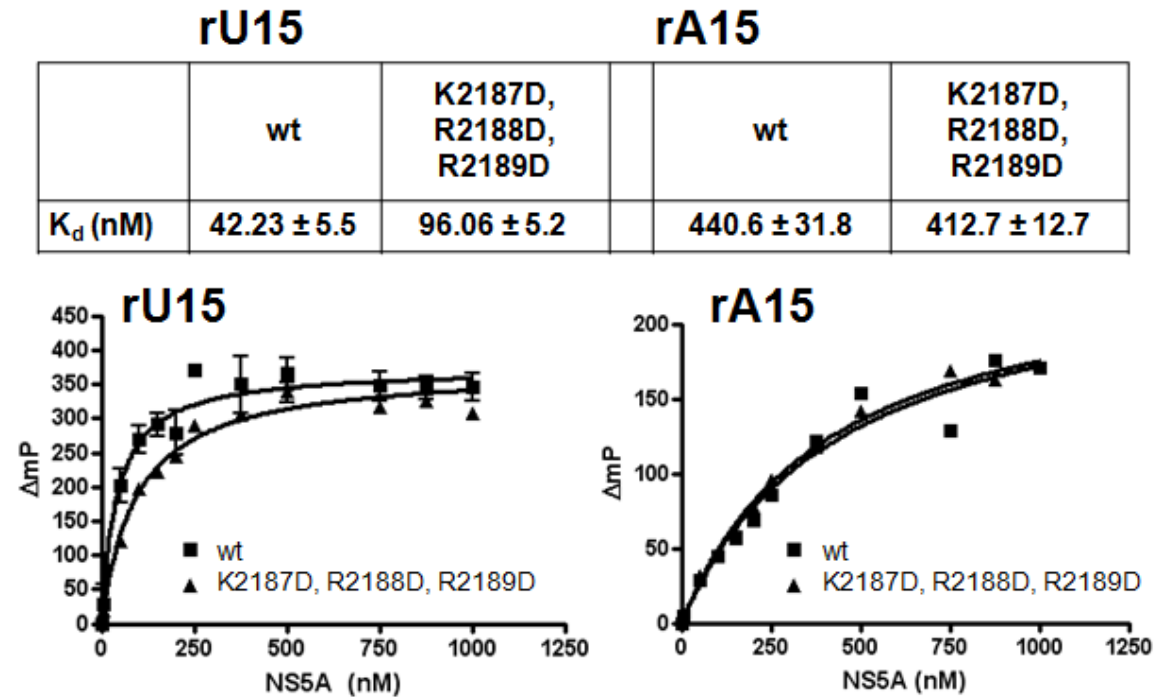
Figure 6. RNA binding activity was observed with NS5A domain 1 plus protein and rU15 and rA15.

Procedure

Cloning

Overlap extension PCR was used to engineer the desired mutation (KRR-DDD) into the replicon DNA. The first piece of DNA used the EcoR1 primer and the S2204I reverse primer with the triple mutant (KRR-DDD) as a template. The second PCR used S2204I forward and Sac 1 reverse primers with the SI/neo plasmid DNA as the template. The third PCR combined the first two in order to make the insert DNA.
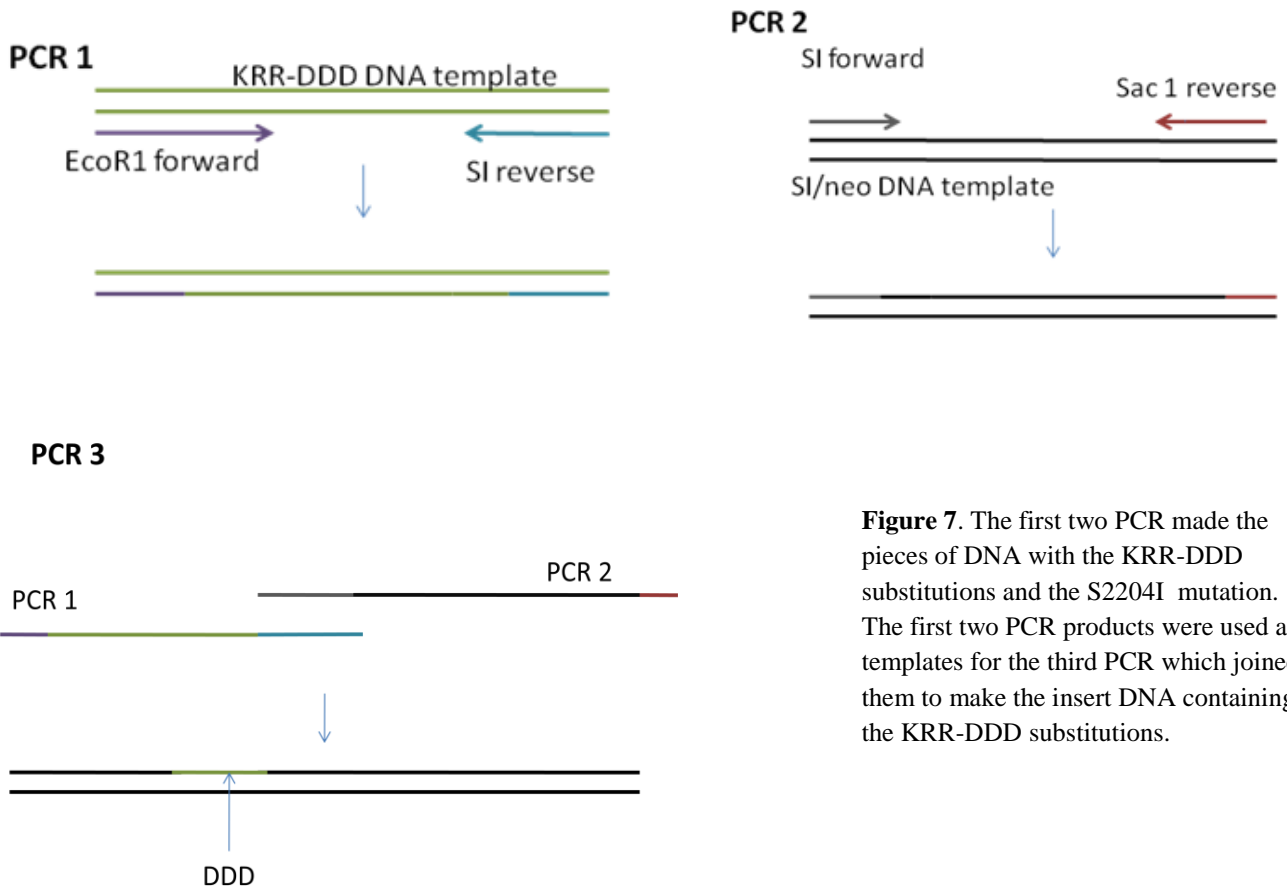
Figure 7. The first two PCR made the pieces of DNA with the KRR-DDD substitutions and the S2204I mutation. The first two PCR products were used as templates for the third PCR which joined them to make the insert DNA containing the KRR-DDD substitutions.

Once the insert was made, it was digested with Xho 1 and EcoR1 restriction enzymes so that it could be ligated into the replicon. This procedure involved incubation of the DNA at 37°C for 3 hours with the enzymes. After incubation, the QIAEX procedure was followed in order to purify the DNA from the reaction mixture.

The DNA vector was also digested with the same enzymes so that the ends of both pieces of DNA would ligate. A shrimp alkaline phosphatase (SAP) reaction prevented the DNA from reattaching to itself after being cut by restriction enzymes. The QIAEX procedure was followed to purify the DNA.

The vector and insert were incubated at 15°C with ligase. Two control groups, the vector with ligase but no insert DNA, and the vector with neither the ligase nor the insert DNA were used as comparisons for the ligation reaction.
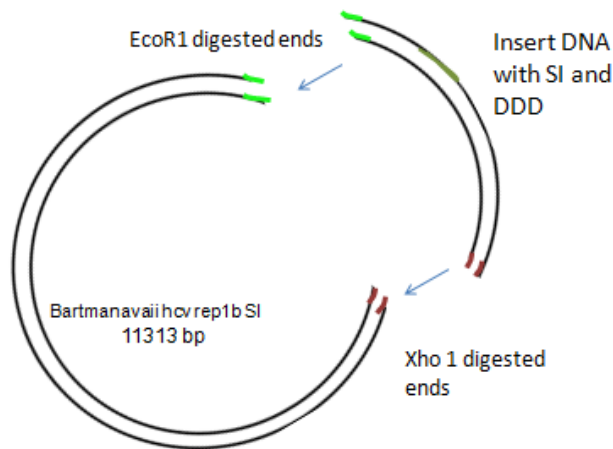
Figure 8. The ligation joined the insert DNA to the DNA vector.

The ligated DNA was expressed by transforming the DNA into MC1060 cells grown in the presence of tetracycline. The bacterial colonies containing the replicon with the ligated insert DNA were chosen and grown in 5 mL cultures at 30°C until they reached an optical density of 1. Then the DNA was extracted from these cells using the MINI prep procedure.

Because the engineered mutation removes a site on the DNA that is usually cut by the restriction enzyme Blp1, the DNA was screened to verify the presence of the mutation by double digesting with Blp1, which cuts within the HCV genome, along with Sca1, which cuts outside of the HCV genome. The reaction product was checked on an agarose gel.

The DNA was also sequenced in order to verify that the DNA coding for the KRR to DDD and the S2204I were present, and that all other parts of the sequence remained the same.

Figure 9. The DNA was screened with Sca1 and Blp1 to verify the correct sequence.

The DNA that contained the correct mutation was then further amplified by inoculating two 500mL cultures with the bacterial cells containing the correct DNA and growing to an optical density of 1. Then, MIDI prep procedures were followed in order to extract and purify the DNA from the bacteria.

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Linearization and In Vitro Transcription

The plasmid DNA was linearized by incubating with a restriction enzyme, Sca1. The DNA was made into RNA with in vitro transcription using RNA polymerase.

Figure 10. The circular plasmid DNA was linearized and then translated into RNA.

Transfection

The RNA was used to transfect Huh 7.5 cells so that they could begin replicating the HCV RNA. Huh 7.5 cells were grown in DMEM growth medium containing 10% fetal bovine serum and 1% penicillin and streptomycin. The Huh 7.5 cells were incubated at 37°C in the presence of the RNA: wild type, SI, or SI/3D. A mock sample contained cells without any RNA.

Western Blot

After transfection, cells were analyzed with a Western blot by first running the samples on an 8% SDS-PAGE gel. The gel was run at 40mA for 35 minutes then placed in the Genie Blotter Apparatus and run at 24 volts for 45 minutes. The gel was blocked with 5% milk solution and washed with TBS-T. The gel was probed with Anti-NS5A as the primary antibody and goat anti-rabbit HRP Antibody as the secondary antibody. Once the antibodies had been removed, the gel was analyzed after being exposed to X-ray film in the dark room.

Colony Formation Assay

The transfected cells were plated at 0.75×10^6, 0.5×10^6, and 0.35×10^6 cells per plate for mock, wild type, S2204I, and S2204I/3D in G418 medium. The G418 media was changed every 3 days. After 3 weeks, the cells were stained with crystal violet to visualize the colonies on the plates.

Results

Overlap extension PCR was used to engineer the KRR to DDD and the S2204I substitutions in DNA as PCR 1 and 2 and then the subsequent pieces of DNA were verified for the correct sizes using an agarose gel. The pieces of DNA from reactions 1 and 2 were shown to be the correct sizes.

The next PCR joined the two pieces of DNA that had been previously made. The two strands were used as templates to engineer a complete DNA product with the EcoR1 forward and Domain 2 reverse primers, providing the necessary digestion sites at the ends of the DNA. This reaction when completed and run on a gel, was shown to be successful as indicated by the appropriate band length of 580 base pairs.
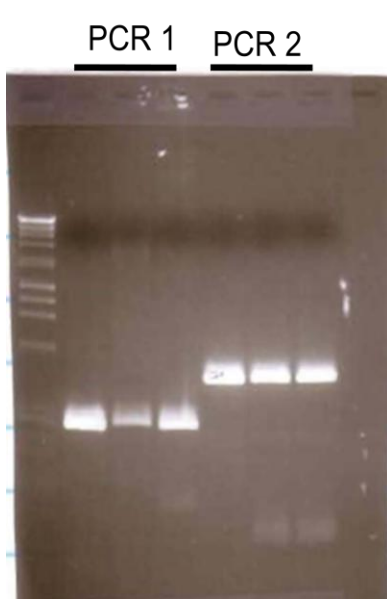
Figure 11.The first two PCR steps were run on an agarose gel to check for bands at the expected lengths.
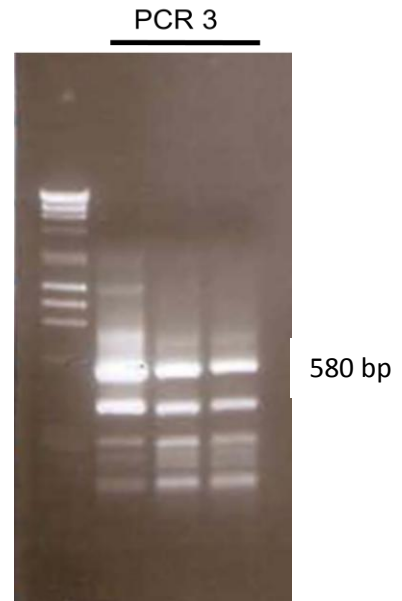
Figure 12. The third PCR was run on an agarose gel to check for the desired band length.

The DNA product was digested with EcoR1 and Xho1 restriction enzymes to prepare the ends of the DNA for ligation. The reaction joined the digested DNA product into a previously prepared DNA vector with EcoR1 and Xho1-digested ends. Successful ligation of the two pieces of DNA allowed creation of a template of the HCV genome with the desired mutations present. Ligations were checked on agarose gels for an upward shift in relation to the vector alone, which lacked the DNA insert.

Figure 13. The ligation reaction was checked on a gel to look for the change in the bands that occurred when the piece of DNA was inserted.

Verification of the ligation reaction allowed for a transformation of the vector into *E. coli* MC1060 cells. Purified MINI Prep DNA was sequenced to verify that the mutation was present. The DNA was screened to check for the presence of the desired DNA sequence by screening with the restriction enzymes Sca 1, which cut outside of the HCV genome, and Blp1, which cut within NS5A. The DNA with the KRR to DDD removed a site on the DNA that is usually cut by the enzyme Blp1, and so in order to analyze the DNA for the presence of the mutation, the DNA was incubated with Blp1. The DNA showed that the mutation was present because it remained intact when exposed to this enzyme.

Figure 14. The screening with the enzymes showed that the DNA contained the mutation when compared to the DNA containing only the S2204I substitution, which was cleaved in the presence of the enzyme.

Further verification of the correct sequence was done by sequencing the DNA. The electropherogram showed that all nucleotides were the same between the wild type and mutant protein, except for the S2204I and the KRR-DDD.

With the desired mutations present, MIDI preps were performed to gain greater amounts of purified DNA. The next step was to linearize this circular plasmid DNA so it could be made into RNA. Using the enzyme Sca1 the DNA was linearized and checked as shown by the gel indicating that the DNA was still the correct size.
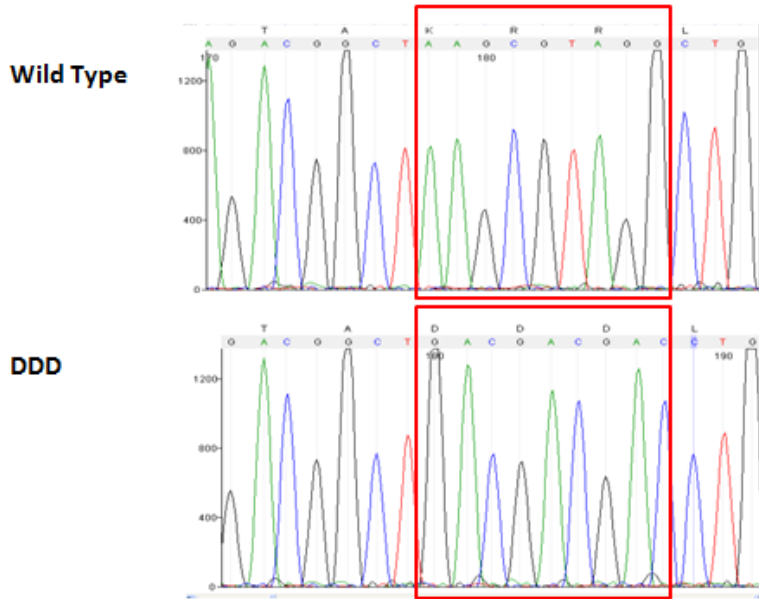
Figure 15.The DNA was sequenced to determine if the mutation was present.

Figure 16.The circular DNA was successfully linearized.

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RNA was made from DNA using *in vitro* transcription for the wild type DNA, the DNA containing the S2204I substitution, and the DNA containing both the S2204I and the DDD substitutions. This RNA was run on an agarose gel.
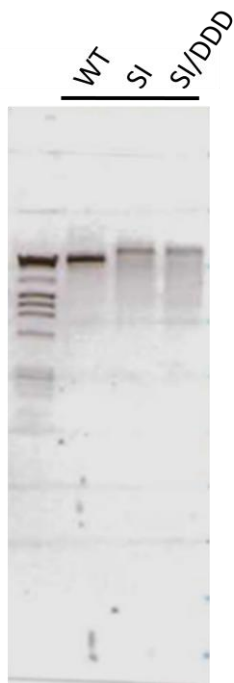
Figure 17.The linearized DNA was made into RNA. The RNA was run on an agarose gel.

Once RNA was made, cells were transfected into Huh 7.5 cells that were grown over night and then analyzed with a Western blot in order to detect the presence of the NS5A protein. Transfected cells were observed for three weeks for the colony formation assay to observe viral genome replication in cells.

Discussion

The results show that the triple amino acid mutation was successfully engineered into the DNA. The DNA was transcribed into RNA and then used to transfect Huh 7.5 cells. These cells were examined for levels of NS5A using a Western Blot and for viral replication using a colony formation assay. These remaining steps are currently ongoing.

The first two PCR steps were completed using the EcoR1, Sac 1, and S2204I forward and reverse primers. Three reactions were made with varying concentrations of $MgSO_4$: 0μM, 1μM, and 2μM. After following normal PCR settings, the reactions were checked on an agarose gel (Figure 11.) The gels show that for PCR #1 and #2, all reactions were successful, so these reactions were purified.

After PCR purification, the two DNA samples were used as templates for PCR #3. This reaction was checked on an agarose gel (Figure 12). Combining the two DNA fragments from PCR #1 and #2 gave the product from PCR#3 an expected length of 580 bp.

Upon completion of the three PCR steps, a digestion reaction was set up using EcoR1 and Xho1 restriction enzymes and a ligation reaction was done and checked on a 1.5% agarose gel. When compared to the control vector, the new vector had a band shifted slightly upward which showed that it had taken in the insert DNA and gained the 580bp insert DNA (Figure 13).

The successful ligation allowed for the vector to be transformed into *E. coli* MC1060 cells. MINI prep was conducted in order to receive a greater amount of DNA. A screen was done to verify the presence of the DDD mutation since this mutation removes a Blp1 cut site that is found in wild type DNA. Screening with the Blp1 showed that the DDD was present because the plasmid DNA was not cut by the Blp1 enzyme (Figure 14). Sequencing the DNA showed that the DDD was the only change in DNA, and the rest of the sequence remained unchanged (Figure 15). Because the mutation was seen, MIDI prep procedures were followed in order to gain greater amounts of purified DNA.

The MIDI prep DNA was cut with Sca1 which made it linear (Figure 16). Using in vitro transcription, the DNA was successfully made into RNA (Figure 17) and used to transfect Huh 7.5 cells. Once the Western blot and colony formation assay are complete, final conclusions will be made.

Conclusion

The effect of NS5A on RNA binding activity was examined by changing three amino acids in domain 1 plus of NS5A: K2187D, K2188D, and K2189D. This substitution altered the RNA binding activity between rU15 and NS5A domain 1 plus, leading to the conclusion that these residues play a role in RNA binding activity.

The ongoing colony formation assay will further elucidate the role of this region in HCV genome replication. Future studies will continue to examine the role of NS5A in HCV function and allow for the development of better antivirals and eventually, a vaccine.

Acknowledgements

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Examining the Roles of African-American Academy Award Winning Actresses Between the Years of 2000-2010

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Abstract

Representations of African-American women in contemporary American cinema have been a heavily critiqued area in academia. Stereotypical roles and representations of African-American women in contemporary American cinema have recurred throughout Hollywood's history. The Academy of Motion Picture Arts and Sciences is one of the most prestigious award organizations in the motion picture industry. Since the beginning of the Academy Awards, there have only been a few African-American actresses who have won Academy Awards for their performances. However, between the years of 2000-2010 there has been a significant increase in the number of African-American actresses winning Oscars. This research study takes a look at the roles of African-American Academy Award winning actresses between the years 2000-2010 and how they may represent and construct Black women's cultural identity.

Introduction

The Academy of Motion Picture Arts and Sciences is one of the most well-known and influential organizations of the motion picture industry. The Academy has been recognizing Hollywood's greatest producers, performers, and professionals since 1927. The organization was founded in 1927 by 36 leading men and one woman who were influential in the motion picture industry during that time. Pioneers such as Louis B. Mayer, Conrad Nagel, and Fred Niblo, along with many others, established a community and a popular award ceremony that still brings Hollywood's stars together every year to honor and recognize one another for their accomplishments and creative work. This organization rewards the motion picture industry's most talented professionals for their achievements and performances every year and has a huge influence on what audiences deem to be the best in the industry. Receiving this praise from this

industry may allow audiences to see the impact and power that this has on the actors and actresses' performances.

At birth of the Academy, with the exception of one woman, all of the members in the academy were Caucasian males. At present, Academy consists of over 6,000 members who have expertise in their area of profession. Among these 6,000 members is an emergence of women and people of color. This broader representation of diversity allows these individuals to contribute to the voting process. The politics of this award system plays a huge role in selecting the types of roles and films that gains recognition and in determining what is considered praiseworthy.

The first African-American woman to ever win an academy award was Hattie McDaniel. McDaniel, won Best Supporting Role for her performance as a mammy in "Gone With the Wind" in 1939. The mammy role is a stereotype that portrays African-American women as a servant figure, which reflects slave women in the antebellum south. Mammy figures were obese, dark-skinned, maternal-figure type of women who were deem desexualized. Fifty years later, Whoopi Goldberg won Best Supporting Role for her performance has a comedic medium in 1990's "Ghost." Goldberg's role as a medium was a stereotypical role as well. The character's comedic and trickery characteristic reflects the historical stereotype of African-Americans as coons. This stereotype is the most degrading of all black stereotypes and deems African-Americans as a minstrel figure.

In the time frame of this study, three African-American women have won Academy Awards for their performances. Halle Berry, Jennifer Hudson, and Mo'Nique, each are contributors to the surge of Academy Award winning African-American women. Each of their roles not only challenges the traditional negative stereotypical roles of African-American women, but they also offer a message about the way in which black women gain mobility and power. The surge of Black actresses winning Academy Awards within the last decade may spark the emergence of something significant in contemporary American cinema.

Literature Review

Stereotypical roles that were associated with black women were the "mammy" which depicted Black women as a servant figure, the "jezebel" which depicted Black women as sexually provocative, and the sapphire" which depicted Black woman as overbearing and undesirable to men. These three particular roles were the only images of black women that people would see on films before the 1970's. (Givens & Monahan). As time progressed, other roles included stereotypes such as the "tragic mulatto", which is a Black woman who favors a White woman, and "Welfare Queen", which is someone who collects excessive welfare payments to financially support herself. Stereotypical roles were created to stigmatize African-Americans and African-American women, and formulate generalizations about African-American identity and culture. Mantau suggest that "persistent and repeated negative images of black women in film can be detrimental to the group generally, and to black women specifically" (Manatu 2003). This statement reflects the idea that a constant reinforcement of stereotypes will strengthen popular belief and generalize African American females a certain way.

African-American Hollywood actresses struggled for visibility in the 20th century as a result of the industry simultaneously degrading and marginalizing them (Regester 2010). In the

history of Hollywood's cinema, many African-American actresses' contributions to cinema have been abrogated or minimalized (Regester 2010). Black actresses such as Dorothy Dandridge and Lena Horne had to live in the shadow of white female actresses in regards to the leading roles and play parts that were opposite of the white female (Regester 2010). Roles held by African American females have been overlooked more often than their white counterparts. The White women was deemed as universally feminine and standardized as the ideal definition of beauty, but black women's bodies were viewed as sex symbols, unattractive, immoral and as the deviant sexual "other" (Manatu 2003).

In the 20th century, black feminist critics and scholars have studied the cinematic representations of African-American women. Many filmmakers, predominately males (both white and black) have produced and directed films about African-American women, but many cultural critics believe that they have failed to capture the experiences of African American women (Manatu 2003). Nearly all of American films starring African-American actresses are directed and produced by males, which may contribute to Black women's experiences within these films, being presented as one-dimensional. The images of African-Americans constructed by films have a considerable impact on the ways in which audiences respond to them (hooks, 1992). Although the pattern of stereotypical roles of African-Americans have become prevalent in American cinema, the essence of black film is not found in the stereotype role, but in what certain talented actors have done with the stereotype (Bogle 2001).

Many scholars have already pointed out obvious stereotypes or negative images depicted by African-American Academy Award winning actresses, but few have examined the complexity of their roles. Wanzo has done an examination on Oscar winning African-American women and their struggles with representing stereotypes and constructing womanhood. Wanzo analyzed Academy Award winning African-American women from Hattie McDaniel to Halle Berry and discovered that their performances in these stereotypical roles tell nuanced stories about African-American women and their roles can be seen as a fully rich and developed character. Reflecting back on the history of African-American actresses and the stereotypical roles they played in films can mislead audiences' perceptions about African-American womanhood and cultural identity (Wanzo 2006). Negative observations and reinforcement of stereotypes could adversely affect views of the entire African-American female population.

The portrayals of black women's sexuality, mobility, attitude, and desires, among other characteristics, have formulated perceptions about African-American women's identity in all forms of media. (Hendricks 2002). Drawing from Olga Idriss Davis's black feminist theory, "black women's discourses are stories of rhetorical strategies of women who transformed the ordinariness of daily life into rhetoric of survival, not only for themselves but for generations beyond" (Davis 2001). Davis suggests that Black women's discourse provides a space not only for experiencing and remembering, but also to reject any myths or stereotypes of Black women's existence (Davis 2001). The history of Black women's lives is symbolic communications that reflects Black women's experiences. Connecting Davis's theories with the performances of African-American actresses, they are able to portray their emotions to the audience and provide insight into the lives of their characters through their roles. As Davis, Hudson, and hooks suggest, the value of personal experiences is at the forefront of black women's identity. Black women's demonstration of those experiences function as evidence that affects black women's

decision-making or knowledge. Black women's history of struggling to be agents and resisting oppression plays a huge role in their strategies of self-evaluation and definition.

Methodology

Rhetorical analysis is commonly used in mass media to analyze television reports, news segments, advertisements and other forms mass communication. Rhetorical analysis looks at intentional persuasion, social values and effects of symbolic forms found in texts, techniques that arts communicate to audiences, persuasion techniques used by characters on one another in dramatic or narrative works, and other elements. Rhetorical analyses of film and any other symbolic communication usually deals with both how works achieve their effects and how works make their appeals to shared interest among people (Blakesley 2003).

Drawing from Blaskesley's rhetorical approach to film, I analyzed how particular messages in the films function. I examined the characters, roles, and how the characters personal experiences were used to persuade audiences. Although Blakesley believes that theoretical frameworks such as feminist and cultural perspectives have been used too many times when studying films, these approaches will establish a framework and guide the rhetorical analysis of this study. Davis and Hudson's black feminist theory helps uncover the desires of the characters and how those desires and rhetorical components constructs and represents Black women's cultural identity. Their theories take into account that Black women have a history of attempting to gain recognition and be agents over their own lives and identities. The characters' desires, transformations, and struggles with controlling their own destinies and identities can make the depictions of these characters seem realistic. Strong deliveries of the performances and the recognition of the characters as multi-dimensional can allow audiences to witness the transformations among the characters in the films. One of the possible reasons these performances may have been so powerful is because of the actresses lived experience and how they drew on them to portray the character.

Rhetorical analysis offers us a way to interpret the performance of ways of knowing (Blakelsey and Prelli). In other words, rhetorical analysis can be used in cinematic presentations to examine the characters and representations that are displayed and how they possibly affect audience's perceptions. Characters in films may seem familiar to audiences through common stereotypes and this may affect audiences' perception about the film and the roles. Rhetorical analysis cannot prove the kinds of attitudes and perceptions of spectators have of the representations that are depicted in their films, but using rhetorical analysis to examine the roles of Black Academy Award winning actresses can help determine the way these depictions construct Black female identity in certain ways. Not all African-Americans may be able to relate to the characters and their personal experiences, but some women to may be able to connect with the personal experiences depicted by each character to some extent.

As Davis, hooks, and Hudson point out, black women's experiences with subjugation and political disenfranchisement has shaped their destinies and identities. Black women have a tradition of resisting oppression, dominant forces, and social struggles, through their use of personal experience as a critical lens, from which to make sense of womanhood. A Black feminist framework, then, combined with rhetorical analysis provides an integrated focus on not just how characters were portrayed, but also on what purposes and objectives guide their actions. I examined the characters and their interactions, what the characters desired, how people

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communicated with them and vice versa. I also analyzed how each character achieved that desire and how they went about achieving it. Although, common stereotypes were evident throughout these films, the rhetorical approach to this study helps shift this paradigm. In order to find this change within these cinematic representations, I used three questions to help guide me through this analysis. What types of characters do these recent award winners play? Do the roles of African-American women in these films perpetuate Eurocentric perceptions of African-American women? Does there seem to be a relationship between the Academy Award winning roles of black women and black women's cultural identity?

Analysis & Discussion

The rhetorical analysis revealed some common threads between each of the African-American Academy Award winners. The characters desired to be loved, obtain social mobility, and have control over their own destinies. They became agents of their own transformations, transformed others through their social interactions and, they all took an active role in creating their own destinies. Davis, Hudson, and Collins' theories about self-evaluation and self-determination are reflected in each of the characters' efforts to strive for power and control. Common stereotypes such as welfare queen, jezebel, and tragic mulatto were depicted by the roles, but the character's choices allows them to fully develop outside of those stereotypes by the end of the film to affect the audience's perceptions of the characters. These roles have caused controversy among scholars and cultural critics because they fear that the continuation of these stereotypical representations exploits not only African-American women, but African-Americans in general. Media representations have strong influences on the way that the people perceive race, gender, and class, and the utilization of stereotypes can increase negative perceptions; however the rhetorical approach functions in ways that may change the viewer's perspectives. Each of the characters makes choices that may be considered undesirable in order to achieve their desires.

In 2001, Halle Berry won an Academy Award for Best Leading Role for her performance in the romantic-drama "Monster's Ball." Halle Berry's character, Leticia Musgrove, desired an emotional connection and stability. After struggling to maintain a marriage with her incarcerated husband for elven years, Leticia finds herself overwhelmed and exhausted financially and emotionally. After her husband's execution and after losing her son in a hit and run car accident, Leticia develops a romantic relationship with a Caucasian man Hank. The two come together because they share common experience. They both suffer the loss of a son whom they had abused emotionally and verbally; their guilt made them vulnerable and in need of emotional support. Despite the fact that her lover comes from a racist background and even when she discovers that he took an active role in her husband's execution, Leticia overcomes racial barriers and is willing to share her life with someone who comes from a complex background.

In the beginning of the film, we see racist characteristics from Hank's character toward African-Americans and the emotionless and prideful attitude he encountered while executing Leticia's husband. The way that he reacts to Leticia shifts the perspective of the film in another direction. This sudden shift of behavior in Leticia's lover shows the transformation that she has made in him through her interactions and commonalities with him. Giving him the emotional

capacity that he desired as well and allowing him to care for her in ways that he didn't care for his son, Leticia's vulnerability gave him a second chance at loving someone the right way.

In the beginning of the film, audiences may see Berry's character as a strong single mother, but she was emotionally detached. Fulfilling her needs to be sexually satisfied makes her character come off as the jezebel stereotype. This may leave audiences to believe that she is so desperate that she is willing to engage in a relationship with a racist Caucasian male, but by the end of the film, audiences witness Berry's character transform into a mutli-dimensional one. They can see her gain the emotional capacity that allows her to fully develop into someone that audiences can relate to. Audiences not only witness her transformation, but they also witness her transform her lover through her interactions with him.

Although Halle Berry has been highly criticized for her performance in this film, specifically for the overt sex scene with Billy Bob Thornton; her character is significant to the history of Black women's lived experiences in regards to racism. Black feminist theory emphasizes the history of African-American women struggling with racial oppression, cultural identity, and domestic and financial adversities in America since the slave era. In an interview with Terry Keefe from Venice Magazine, Halle Berry said that she had to fight for the part and convince Marc Foster that she was right for it. Her struggles with racism, financial burdens, and identity helped her identify with the character. She felt that she was capable of bringing life and dimension to this character because of her personal lived experiences.

In 2006, Jennifer Hudson won Best Supporting Role for her performance as Effie White in the hit musical film and based on the theatrical play, "Dreamgirls" based on a true story. Effie White was the group's lead and best singer. A woman with a strong and powerful voice to match her assertive personality, Effie was determined to make her dreams a reality. She desired to be a famous singer and rise to stardom on her own terms. She felt power and confidence in her voice and was fully aware of her potential and talents. Effie's voice played a role in her ability to obtain the mobility, and confidence that she needed to express how she felt and articulate her story in the public spheres.

Effie loses access to audiences and opportunities when she was rejected for a more conventional character Deena Jones, someone who is fair-skinned, thinner "more attractive", and appeals to the white mainstream ideal. This character depicts the tragic mulatto stereotype, which is a black woman who favors a White woman. Left feeling neglected and unappreciated, Effie bluntly expressed her emotions which sometimes resulted in heated disputes between her and everyone in the group. Unfortunately, Effie's strong personality led to her dismissal from the group, leaving her to give up her singing career.

In the beginning of the film, Hudson's character may have come off as someone who was very assertive, confrontational, and defensive, which reflects the stereotype of a sapphire figure. By the end of the film, audiences realize that Effie's desire was to take control of her own destiny and identity. Audiences, specifically Black audiences, may also be able to understand Effie's character. In Black culture, color disorientation within the Black race has always been an issue. Effie's anger and frustration was fueled because she was discriminated against because her physical appearance did not meet a white mainstream ideal. Although Effie didn't achieve her desire to be a famous singer, she took an active role in creating her own destiny and she helped the other women in the group do the same. She set an example by refusing to let anyone or

anything jeopardize or get in the way of maintaining her independence and mobility in her life. Effie's struggle for visibility into the mainstream, struggle for her voice to be heard, and enduring the hardships of being a single-mother, represents African-American women's struggle for their voice to be heard in a patriarchal society. In black feminist discourses about black women's agency, Davis and Hudson discuss the women during the Blues tradition. African-American Blues singers would use their voice and music to tell their stories about the oppression, underrepresentation, and marginalization that they experienced throughout their lives. Effie was an example of the Blues women archetype because, like them, she was passionate about her music and wouldn't let anyone compromise her success. Like that of the Blues women, Effie's music was symbolic communication that was a symbolism of resistance and social mobility.

Jennifer Hudson has spoken out about her rise to stardom after winning an Academy Award and how she worked hard to make her dreams come true. Despite her short run in American Idol and coping with a family tragedy, Jennifer Hudson's effort to tell her story and express her identity through her music contributes to her success. Although the stereotypes of "welfare queen" and "tragic mulatto' are reflected in Effie and Deena Jones's character, Hudson's role as Effie, destabilizes reading Hudson's character as an activist, the film ends with Effie performing and reuniting with the group. This ending emphasizes unity and perseverance and how all of the women shared a common dream and standing up against male dominant forces and Eurocentric mainstream ideologies.

In 2009, comedian Mo'Nique won Best Supporting Role for her performance as Mary Lee Johnston in the drama film directed by Lee Daniels, "Precious: Based on the novel Push by Sapphire". Antagonist Mary Lee Johnston, an unemployed mother on welfare, desires to be loved and have a sense of control over her life. After Mary's husband sexually abuses their child Precious, resulting in her having two of his children, Mary is left feeling powerless and unloved. Treating her daughter Precious as if she was worthless and nothing more than a servant, Mary constantly uses vulgar and provocative language when speaking to her daughter. Mary gains that power and control that she desires by instilling not only fear into her daughter's heart, but feelings of inadequacy and worthlessness. Throughout the film, Mary lashes out on Precious about having two children with her father and constantly blames Precious for the dysfunction within the family. This emphasizes that Mary is not only psychologically damaged and ill, but resentful toward her daughter for "stealing" her man.

In the beginning of the film, audiences may see Mo'Nique's character as a lazy and monstrous mother who takes pride in belittling her child. Refusing to let anyone or anything, jeopardize her eligibility to receive the government's assistance to financially support herself and her daughter, Mary's character depicts the stereotype of a Welfare Queen. By the end of the film, audiences may feel sympathy for Mary because they realize that she's dealing with is a mental illness. Although Mary tries to justify her abusive behavior, audiences can see that all she really wanted was to feel loved and as if she belonged. They can see that evil-spirited and abusive mother let her guard down as she cries in hope of someone to understand her pain. Audiences can see her character fully develop into a multi-dimensional and complex one. She has desires, basic needs and wants just like anyone else and audiences witnesses the humanity in her character. Although Mary doesn't achieve her desires in a positive way, she does realize that the only way to get her life back into order and gain control over her life is to make amends with her daughter and seek her forgiveness. Not only do audiences witness transformation in Mary, but they also witness the

transformation that she advanced within her daughter. Her extreme abuse and complete power over her daughter drove Precious to become an agent over her own life. Precious accomplishes goals and overcome adversities although her mother made her feel as if she was incapable of doing so. She gains custody of her two children, improves her reading and writing skills, and builds strong relationships with her teacher and classmates; all things that her mother tried to take away from her.

Despite the stereotypical role of Mary Johnston as a welfare queen is presented in the film, it connects to black feminist theories of women struggling to become agents over their own lives. Mary's mental illness hindered her from achieving her desires in a positive way and she was unable to overcome the barriers in her life. Between feeling neglected and rejected by her husband and driving her daughter away, Mary didn't have any order in her life.

Although all African-American women may not share the exact same experiences, the film definitely conveys a powerful message and reaches out to women who may have experienced these particular struggles. Speaking publicly about her traumatic experiences with molestation from her brother, Mo'Nique said that she used that experience to inspire and channel her character as Mary Johnston. Mo'Nique had to relive a traumatic experience by playing the role of Mary, but she said that playing this role empowered her." I no longer want to be considered a victim of molestation", said Monique. "I want to be considered the victor."

Mo'Nique's personal lived experiences contributed to the power that her role held and the ability to make the film seem realistic. With incest being the reality of Mo'Nique's life allowed her to add complexity to her role as well as complexity within the audience's perceptions and feelings about her character.

Conclusions

The distinctiveness within these roles may suggest that the Academy of Motion Picture Arts and Sciences may be coming to terms with the Black women's cultural identity and womanhood. The ways that Black women identify, name, and respond to oppressive forces, is represented in particular ways throughout each of the actress' roles. There was a time when Black actresses didn't have distinctions between the roles that they could play nor were they receiving recognition for their performances by award systems such as The Academy of Motion Picture Arts and Sciences. Although there was an increase in African-American Academy Award winning actresses within the last decade, the issue of the invisibility among African-American actresses still remains.

In my analysis of the films, I found that the roles in these films don't necessarily perpetuate stereotypes of African-American women, but they do utilize them to introduce the characters. Not only can African-American women relate to these stories within these films, but women of all races can relate as well; particularly if their lived experiences are reflected. These roles reflect full, rich, and developed characters as multi-dimensional human beings who have basic human desires, needs, and wants. These stereotypes work in these films because these are stereotypes that audiences are familiar with, which makes audiences believe that the film that they are viewing is the same as any other film they've seen before. However, there is a bigger message behind it and some may understand the essence of the story.

Both Black women's cultural identity and the roles of African-American Academy Award winning actresses are both complex things. Living in a society where women are constantly trying to overcome social and political struggles, they are always trying to have control over their lives on their own terms. Black women have always had the desire to have power and control over their own destinies, but dichotomies such as male domination and racial oppression have presented barriers, which is why the characters' interest in self-determination and evaluation can be a useful analytical tool to study symbolic communication about any gender identity no matter the racial background. The desire for love, control, and overcoming barriers of ones' life, are all components of womanhood in the 21st century. Furthermore, these films suggest that women's' experiences with social struggles influences, but does not, determine their identities. Those struggles pushed them to obtain and maintain mobility and resist dominating forces.

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Child Labor: An analysis of its predictors and policies

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Abstract

The literature regarding child labor primarily focuses on its relationship with a nation's wealth but rarely analyzes this relationship in conjunction with other population/demographic and opportunity variables. The current study examines the relationship between child labor rates and these three dimensions: economic, population demographic and opportunity variables. A three model linear regression table shows that GDP per capita is a significant indicator for high rates of child labor, as are total fertility rates, percent of women in the labor force, and literacy rates. Two case studies of countries with the highest and lowest rates are individually analyzed.

Introduction

Over 200 million children worldwide are employed in occupations that are exhausting, difficult and, in some cases, dangerous in nature. In families that struggle financially, children oftentimes forego an education in order to help provide an income. Often times, this decision is out of their hands and determined by outside circumstances. Scholarly attention devoted to understanding what child labor is and how to define it directs our attention to considering the practice as complex in nature. What is important for people to understand is the relationship between child labor and poverty. Various authors and critics, such as Eric Edmonds and Nina Pavcnik, suggest a strong correlation between the prevalence of child labor and poverty. Impoverished households will use children to supplement their income (2005). In addition to poverty, these scholars highlight the importance of culture, policies, land ownership and other indicators in the practice of having children in the workforce. My research project will analyze the relationship between a country's Gross Domestic Product (GDP) and rates of child labor. Also, I will be analyzing the relationships between child labor and other predictors in order to understand what influences its occurrence.

Previous studies have examined poverty by analyzing their Gross Domestic Product, a measurement used by nations to define their wealth. This approach defines poverty solely in terms of the amount of a country's economic wealth or lack thereof and can assist in predicting child labor rates in developed and developing countries. However, this measurement is not

sufficient because GDP does not account for how wealth is distributed, an important indicator for why child labor takes place.

I will begin my research project by reviewing research produced by scholars on the issue of child labor. Then, I will analyze what I have learned from the available information and fill in the gaps by critically analyzing different elements of child labor that require empirical support. I will extend this concept to looking at other influences aside from GDP per capita (as it is a more precise measurement of individual salaries within a nation) by analyzing other factors typically attributed to child labor that interconnect with other determinants such as: population size, literacy rates, measurements on the human development index (HDI), average years of schooling, life expectancy, total fertility rates, percentage of people living in rural settings, and percentage of women in the labor force. I will do this by collecting data on the varying determinants across 76 countries (ranging from developing to developed countries). Once I have finished gathering and analyzing data from my cross-sectional study, I will evaluate two case studies of countries with the highest and lowest rates of child labor. Through these case studies, I will evaluate policies implemented in the chosen nations and analyze the differences found among the determinants I am testing.

As a result of my findings, I will have determined whether or not there is a correlation between a country's gross domestic product per capita and its rates of child labor. In addition, I will examine other influential factors and if they turn out to be as significant as or more significant than a country's economic standing.

Defining Child Labor

Child labor has received a substantial amount of attention in fields such as economics, sociology, and political science. Although scholars such as Eric Edmonds (2007) and Kaushik Basu (1998) have attempted to account for why it exists, it is important to identify the various contexts in which the term is used. Within a Western context, the term is associated with images of children toiling away in hazardous conditions harvesting and tending to crops, or in factories (e.g. "sweatshops") for little or no pay. While it is true that the ways in which child labor affects children is the focus of certain studies about child labor policies, other studies attempt to make sense of how these policies define what constitutes "labor." For instance, the International Labor Organization's Convention No. 138 classifies fifteen years as the minimum age which, under regular conditions, an individual may participate in economic activity through various acts of work for pay (ILO, 2011). Economic activity, as we can see through Eric Edmonds and Nina Pavcnik's study "Child Labor in the Global Economy," is not limited to for-profit factory or migrant labor—some policies include the role of family-owned business operations and management in children's economic activities. For instance, they point out that child labor can be defined by whether or not the child "works in family enterprises that are making primary products for the market" (2005, p. 200-201). According to the 2010 "Global Report on Child Labour", the International Labour Conference states that more than 200 million children have to work instead of investing that time and energy into their future (p.1). Given that labor can also include a child's labor activities in the domestic sphere, these policy definitions make it difficult to automatically associate child labor with work outside of the household., especially when a

majority of statistics and surveys do not take domestic work into account as child labor or as a contributor to a country's GDP.

Family Influence

When families are faced with financial struggles, their only means of economic support is to put every able body in the family to work in order to help supply an income. My mom is an example of this. In the Dominican Republic, my mom was employed in a wealthy family's home to babysit the children and perform all of the domestic work at the age of ten because her mom could not be the sole provider. Despite discrepancies in defining exactly what constitutes child labor, "most working children are employed by their parents rather than in manufacturing establishments or other forms of wage employment" (Edmonds & Pavcnik 2005, p. 202). Edmonds and Pavcnik note that cultural norms influence the way parents allot their children's time. In cultures, such as India, where one sex is more valued than the other, investment in that sex is more profitable for the family and the other sex may be more inclined or required to work. For instance, if it is believed that the son will come back to care for the parents, a majority of the family's available resources will be devoted to ensure the son's success in order to secure a future care provider in their old age.

In the book "Child Slavery: A Contemporary Reader", Gary Craig (2010, p. 85) expands on the idea that in many places the use of children as a source of labor is viewed as normal and beneficial to the children and their families. This view is especially true for girls in countries that view women as unequal to men. The futures for girls in this culture consist of holding the roles of mothers and wives one day, catering to their husband s and maintaining their families. These domestic worker roles are considered a suitable occupation due to social restrictions and cultural norms. What this introduces is a depiction of how gender roles and cultural acceptance can impact and reinforce child labor. Furthermore, Kaushik Basu, Sanghamitra Das and Bhaskar Dutta (2007, p. 7) note that the exclusion of domestic work as a measure of child labor grossly underestimates the amount of work girls do in comparison with boys. This cultural disregard of considering domestic work as a form of labor not only undermines the role of females but also ignores the amount of time children invest in performing domestic tasks.

Across family generations, "low educational attainment leads to lower income leads to lower educational investments in the next generation, an educational poverty trap" (Edmonds 2007, p.33). If members of a family are spending their time working instead of improving their economic situation by obtaining more education, then this inevitably leads to a cycle in which long work hours for low pay are foreseeable. The amount of education the parents have can also play a pivotal role in the amount of children they desire. As Doepke and Zilibotti observe in their article "Macroeconomics of Child Labor Regulation", fertility decisions among families vary within numerous political steady states and impact on the number of children per family (2005, p. 1493). Emily Blanchard and Gerald Willmann (2010, p. 3) define political steady states as states that are economically balanced under which the majority will vote to maintain the status quo trade policy. If child labor is banned, Doepke and Zilibotti concluded that young, unskilled workers who haven't decided on size of family yet, have more leeway when it comes to opting for smaller families and educating their children. However, when adults have families, their views on child labor regulation are affected by how many children they have. If child labor is

legal in one steady political state, families are more likely to bear more children. The potential loss of income from their children not participating in the workforce is incredibly severe in families with many children so there is little support for child labor regulations. On the other hand, in the other steady political state where child labor is banned, families are smaller in size and there is a wide range of support for child labor regulations. The combination of a country's economic balance, which can be hinted at by its GDP, and fertility decisions can either positively or negatively impact rates of child labor.

Wealth and Labor

Edmonds and Pavcnik discuss three elements of poverty and their relation to child labor in their article "Child Labor in the Global Economy" which helps us to see the economic aspect of child labor (2005, p. 202) The first facet is that child labor appears to decline as improvement in household living standards improve. Although there may be increased employment opportunities for children, parents will not have to send their children to work if their incomes rise in line with trade. The second facet is that child labor seems to be incredibly sensitive to the family's economic situation. Lack of job opportunities and access to credit impacts the number of children working and their hours. The third and final facet is that poor local institutions related to poverty, such as ineffective or expensive schools, could possibly force children into the labor force.

Since poverty is an important indicator of child labor, Basu, Das and Dutta sought to establish a relationship between land wealth and child labor within families in their paper "Child Labor and Household Wealth: Theory and Empirical Evidence of an Inverted-U". Given that an abundance of literature suggests that the main cause of child labor is poverty, it only seems fitting that with increased land there would be an increase in wealth and therefore a decrease respectively (2005, p. 1). This assumption is sometimes referred to as the 'luxury axiom', which is the notion that land is usually strongly correlated with a household's income. However, Basu et. al's paper discusses how imperfect labor markets may drive families to employ their own children to improve their economic status due to lack of access to nearby job opportunities. The data set used in this paper showed that, "controlling for child, household and village characteristics, the turning point beyond which more land leads to a decline in child labor occurs around 4 acres of land per household" (2005, p. 1). When the household comes to acquire some wealth in the form of land, children will begin to work more because they are able to. Although, beyond the threshold level, households may be financially stable enough to not have to rely on child labor and may do away with it entirely. Nevertheless, increased land ownership and increased wealth will not necessarily reduce the incidence of child labor.

In order to elaborate on the complicated relationship between household wealth and child labor rates, authors of "Combating Child Labor: A review of policies" draw attention to the relatively small impacts income has on child labor (2003, p. 37). They point out that there is substantial support for the idea that landholdings tend to increase the chances that children will work and decrease the chances that they attend school. This refers back to the idea that most children who are employed are often doing domestic work, which is typically not labeled as child labor. However, it is important to understand the roles lack of wealth have as well.

In some instances, the only feasible option is to have children work to help support the livelihood of the family. Myron Weiner, author of "The Child and the State of India", expresses how although some government programs intended to provide methods of generating incomes for the household (like providing families with cattle) result in a need for more domestic work which in turn is likely to increase the need of the family for labor (1991, p. 206). However, what is important is to provide children with various choice sets so that they are not choosing between forfeiting the opportunity to obtain an education to better their circumstances and working to help improve their family's current economic situation.

Conflicting Views on Education

In a majority of cases, apart from the rare instances where parents are abusive on impulse, parents would rather see their child succeed and would only send them to work if they had absolutely no other choice. A majority of literature will look at education as a solution for poverty and an end to child labor. Basu et. al discuss how availability of good schools and simple incentives promoting attendance (such as a meal for the child or some form of payment to parents who have children in school) can help to curb the dependence on child labor (2005, p. 1). Then again, when education is not readily available or easily accessible, options for the child become extremely limited. As noted by Doepke and Zilibotti, an alternative to education consists of child labor and that a common assumption is that working children are competing with unskilled adults in the labor market (2005, p. 1492). However, various authors have come to find that contrary to these assertions that children are used for labor because they perform more efficiently for specialized tasks due to their dexterity and "nimble fingers", it was found that child and adult laborers fare equally in reference to tasks and productivity. Though some children may enter the workforce in the hopes to complement their schooling, most are denied the opportunity to obtain an education and wind up working in horrid conditions (Craig 2010, p. 83).

The decision between whether you send your child to school and struggle financially while doing so, or risking their future by having them forego their education is a daunting one. Though Westerners typically view child labor as an injustice, others see manual labor for children as a method for building character and developing a strong sense of purpose. In the article "Labouring under Illusions", Beatrice Newbery expands on the idea that Western civilizations and 'Third World' attitudes differ in the sense of what they believe roles of children are. For instance, she presents the concept that in the Ladakhi culture, children were considered a vital part of working in the fields and were taught valuable skills such as storing and planting crops. Currently, students are being removed from the fields and placed in classrooms as a means of advancement. Helena Norberg-Hodge, director of the International Society for Ecology and Culture, further expresses that "there is a blanket assumption that wherever children work, it is an abuse," she says. "But working with the family and community helps to share their identity, gives them a vital role in life and a feeling of responsibility and belonging" (2000, p. 20). However, children are beginning to lose their knowledge of agriculture and replacing that knowledge with maths, geography and English instead.

In this culture, the 'Victorian' style of education resulted in a failure rate of 95% for students as it did not provide students with education that would be useful in their current

circumstances. The message they receive from school is that they should be dissatisfied with their lives and their traditional lifestyle because their education tells them that they live in squalor. This provides insight as to why many parents consider education as useless when their children are losing their traditional skills which will furthermore interfere with future agriculture systems that are central to rural communities. Their argument is that the 'Victorian' education (as they like to refer to it) fails to take into account what daily life is like in rural villages and the necessary trades that are essential to survive.

Despite the argument Newbery presents, Weiner's study in the book "The child and the state in India" proposes that during a time where India had no compulsory education and when child labor was not illegal, they became the world's largest producers of illiterates (1991, pg. 3). Less than half of India's children between the ages of six and fourteen were not in school at the time of the study, having equated to about 82 million children. Most children who started school dropped out and of those who entered the first grade, only four out of ten completed four years of school. This lack of education ultimately deprives students of the possibility of being employed in the service sector or obtaining a white-collar job position as technological advancements are calling for a more skilled and educated workforce (1991, pg. 205). As noted by Weiner, there has been a plethora of underdeveloped nations that have employed mass education and compulsory attendance in the face of poverty. Weiner's analysis of India's low per capita income and economic situation indicates that belief systems of the state bureaucracy play a more vital role in child labor rates than previously believed. Weiner then delves into describing that these belief systems are:

> "a set of beliefs that are widely shared by educators, social activists, trade unionists, academic researchers, more broadly, by members of the Indian middle class. At the core of these beliefs are the Indian view of the social order, notions concerning the respective roles of upper and lower social strata, the role of education as a means of maintaining differentiations among social classes, and concerns that "excessive" and "inappropriate" education for the poor would disrupt existing social arrangements" (1991, p. 5).

Both arguments address the fact that we cannot simply look at education as a solution when we do not have an understanding of the deeper problems that are contributing to child labor. An obvious indicator involves economic inequalities in the global economy, but we must further inquire about Western conventions regarding the value systems and lifestyles of other societies. Moreover, it is important to analyze the standard conceptions of education that progressively permeate around the globe.

Data and Policies

Dan Rees, manager of the Ethical Trading Initiative explains that "child labor arouses more emotion in people than any other issue we deal with" (Newbery 2000, p. 18). Various aid agencies and Western nongovernmental agencies have established a mission to ensure that child labor is widely prohibited. According to the report "Global Report on Child Labor 2010", the International Labor Organization, has a strong focus on working to eliminate the use of child labor and has become the world's most important source for child-labor related statistical

information (p. 5). Established in 1998, the Statistical Information and Monitoring Programme on Child Labor has enabled the ILO to support over 300 child labor surveys. These surveys are necessary to develop sufficient data on the issue, its magnitude and how to formulate a plan to combat it. The possibility of developing surveys has also allowed the ILO to form stronger connections with crucial partners such as the interagency Understanding Children's Work programme. This program was launched in 2000 in association with the World Bank and UNICEF, strengthening the ability to collect and analyze data considerably.

Obtaining data on the matter of child labor is possible through national household surveys. Surveys conducted from the timeframe of 2004-2008 helped to create about 60 national data sets for the 2010 round of global estimation of child labor by the ILO (Global report on Child Labor 2010, p. 13). Data were obtained from over 50 countries and aided in developing multiple data sets across a spectrum of years. One example of a household survey is provided by the article "Child Labor and the Transition between School and Work". Akee et. al developed a survey method in which children were involved in a game used to measure their time allocation between school, work and leisure activities (2010, p. 136). The child is asked to choose ten cards among three different sets of colored cards in order to select cards that correspond to their week's activity. This game resulted in the knowledge that parents, who are largely responsible for determining how children spend their time, tended to over-report their children's leisure time in comparison with their own children's response. Results from household surveys are necessary in determining the frequency and severity of the issue and developing policies to handle it.

One of the earliest pieces of legislation developed as a means to prohibit child labor was the labor law put into place by the state of Massachusetts in 1837 (Basu 2005, p. 1091). This law forbade firms from employing children under the age of fifteen years who had not attended school for 3 months, at the very minimum. From the time period 1880 to 1910, rates of child labor dropped dramatically, due largely in part to activism against the matter (Basu 2005, p 1090). In 1900, twelve states set an age limit of fourteen years for employment in manufacturing. Ten years later, thirty-two states had implemented similar restrictive laws. The relationship between the decrease in child labor rates and the introduction of policies reinforces the notion that legislation can have an impact. In this article, Basu compares intra-national efforts and supra-national efforts in order to determine which is more effective in curbing child labor rates. Intra-national efforts consist of laws ratified by the country and methods of prevention and intervention within a single national boundary. An example of an intra-national effort would be the Massachusetts law enacted in 1837. Supra-national efforts are more complex and are performed through international organizations such as UNICEF, the World Trade Organization and the International Labor Organization. Their interventions involve persuading nations to abide by established conventions and employ them within their own boundaries (2005, p. 1092).

An example of a powerful mechanism utilized to control child labor would be international labor standards, which are minimal rules, standards and conditions of labor that countries must abide or they are liable to face disciplinary actions, such as the imposition of trade sanctions. Even though the International Labor Organization has placed child labor on the national agenda for numerous countries, an analysis of national laws established in 65 countries, showed a mere 19 have specific laws regulating child labor. Author Gary Craig argues that "specific local regulation and enforcement remains almost non-existent because of a perceived conflict of interest with regard to privacy laws, inherent difficulties in regulating informal sector

activities, backed up by continuing societal assumptions that children are well protected in private households" (2010, p. 87). Both measures, intra-national and supra-national, are effective to some degree, but what is important is determining whether they are more effective when they are both enacted or if one is more efficient than the other. While it is unclear which type of policy is essential for change, what is certain is that something must be done.

Reprimanding Countries

When countries do not abide by international labor standards, punitive measures can include trade sanctions. The article "Child Labor" describes the methods the United States take when dealing with other countries importing goods into the U.S. using child labor (2007, p. 22). The U.S. House of Representatives deliberated on the "Child Labor Elimination Act which would impose general trade sanctions and deny financial assistance to countries with elevated occurrences of child labor. Not only can legislation impact trade sanctions between countries, but boycotts can be a very powerful influence as well. Newbery analyzed this observation in her article "Labouring Under Illusions" when she observed the impact the threat of a 1994 U.S. boycott against Bangladeshi garment factories with children employed (p. 19). As these factories did not want to lose business and were afraid of the repercussions they could potentially face, they fired over 10,000 Bangladeshi child workers, most of whom were girls. This resulted in a shift of working in a garment factory to being employed in more hazardous work such as brick breaking, begging or even prostitution. Policy and research adviser Rachel Marcus emphasized in this article that "those who initiated the boycott believed they were combating an abuse of human rights. In Bangladesh, it was viewed as a case of Westerners selectively applying universal principles to a situation they did not understand" (Newbery 2000, p. 19). According to the paper "Is Product Boycott a Good Idea for Controlling Child Labor? A Theoretical Investigation", Basu examines the impact of boycotts of child labor tainted products and how the boycotts can actually result in a rise in child labor which is known as the 'adverse reaction proposition' (2005, p. 3). Trade sanctions have the potential to reduce family income and force families to make their children work other types of jobs that are more threatening to their well-being.

Solution?

Although boycotts and trade sanctions could produce negative effects, one thing that these efforts against child labor can agree on is that elimination of child labor is the ultimate goal. The 2010 "Global Report on Child Labor" clarifies that in 2000, the International Labor Organization's Convention No. 138 was put into action to eliminate the worst and most detrimental forms of child labor by the year 2016 (p. 6). The 2006 Global Action Plan calls for "mainstreaming child labor concerns in national development and policy frameworks, the development of knowledge, tools and capacity, and resource mobilization" (p. 19). Policies developed to combat child labor are incredibly idealistic in theory; however, there are some limitations that could hinder achievement of their purpose. Edmonds and Pavcnik discuss how policies that might keep children from working in one type of job might actually push them to another job that is more hazardous in nature. Policies that focus on banning child labor or requiring that children attend school are difficult to enforce and do not necessarily guarantee that local labor markets will be positively affected in a manner that will raise average family income

(p. 216). In the article "Labouring Under Illusions", Khalid Hussein, a young child laborer, was interviewed and asked about whether it was his choice to work and if he liked doing so. He replied "I stitch one football per day after school. Most of the people in my village stitch footballs. If there was a ban on child labor, most of the people in my village would go hungry (Newbery 2000, p. 18). Hussein sees his choice set as working and going to school or going hungry. However, if policies were directed at improving school infrastructure, reducing the cost of schooling and improving the income of parents so that children would not have to work, then incidences of child labor would decrease significantly.

Developing nations battling with the dilemma of child labor, poverty and an absence of education can look to Kerala as an example of how to improve educational infrastructures and the lives of countless children. In her book *The Elimination of Child Labor: Whose Responsibility?*, Pramila Bhargava states that Kerala, an Indian state, spends more on education than any other state government (2003, p. 25). Every child is enrolled in primary schools as their resources are dedicated to spreading mass education as opposed to higher education. Some policies they have implemented include land reforms and raising minimum wage so that parents are not dependent on the support of their children's labor. Though Kerala can serve as a model for other countries to follow, this is not to say that higher spending on education is the singular solution for ending child labor. As the authors of *Combating Child Labor: A review of policies* state, "appropriate response to combat child labor depends on the nature of the problem and on the country's administrative and institutional framework as well as the commitment and enforcement capacity of governments to combat it" (2003, pg. 37).

Conclusion

There is a vast amount of literature available on the correlation between child labor and poverty as its main predictor. However, there are gaps in research as poverty is largely discussed as economic wealth but other variables are rarely mentioned as playing propagating roles. In addition, the best solution for a country's child labor rate has not been determined to be either an intra-national effort or a supra-national effort. Is it better to hold a country liable by punishing them with trade sanctions or are establishing programs aimed at improving the infrastructure of educational systems and raising incomes more effective in the long run? In my research, I will discuss different variables and factors that may play a role in high child labor rates. Also, I will evaluate various indicators, such as the gender inequality index which is used to measure cultural values about the status of women, and policies across varying nations towards child labor to assess whether or not that plays a role in their conformity and obedience to international standards. Furthermore, I will analyze policies' success rates through various case studies and determine what may be the best route for curbing child labor rates.

Theory

I am examining the predictors of child labor in 76 countries. I expect that structural variables will influence rates of child labor. Since research suggests that poverty is strongly correlated with high rates of child labor, my hypothesis is that countries with higher levels of

Gross Domestic Product per capita (GDP per capita) will be more likely to have lower levels of child labor than those with lower GDP per capita. In addition, I will further examine other potentially influential variables to determine whether their relationships with child labor rates are stronger than the relationship with GDP per capita or if they modify that relationship. I will measure these variables in three different categories: economic variables, population/demographic variables, and opportunity variables. For the economic variable, I hypothesize that countries with a higher GDP per capita will result in lower child labor rates. For the population/demographic variables, I hypothesize that countries with a greater population size will result in higher child labor rates because with a bigger population, there is a larger pool of potential workers and a larger population that needs to be tended to. Also, countries with a greater percentage of its population residing in rural settings will have higher percentages of children in the workforce. I expect that countries that measure higher on the Human Development Index (HDI), have a lower fertility rate, and a higher life expectancy will consequently result in low child labor rates. In response to the opportunity variables, I predict that countries with lower literacy rates and a lower number of average years of schooling will have higher child labor rates. In contrast, I hypothesize that countries with a higher percentage of women in the labor force will result in a lower percentage of children working as there won't be a need for their labor. A thorough analysis of the relationship between child labor rates and the variables I am testing for will provide insight on indicators of the issue.

Method

The research design I will use is a secondary quantitative data analysis of child labor in 76 countries. The data were obtained from sources such as the International Labor Organization (2011), the World Bank (2011) and the United Nations Development Programme (2010). I will supplement my findings with two case studies examining policies and preventative measures in place and evaluate the impacts these policies have on child labor rates.

The variables I will be analyzing consist of countries' gross domestic product per capita, the percentages of girls and boys working, literacy rates, total fertility rates, measures of the human development index (HDI), percentages of population living in rural and urban settings, life expectancy rates, and percentages of woman in the labor force. Gross Domestic Product (GDP) per capita is gross domestic product divided by midyear population (World Bank, 2011). Literacy rates are the percentages of people ages 15 and above who can, with understanding, read and write a short, simple statement on their everyday life. Total fertility rate (TFR) represents the number of children that would be born to a woman if she were to live to the end of her childbearing years and bear children in accordance with current age-specific fertility rates. The final variable I will measure is the HDI, a summary measure of human development. It measures the average achievements in a country in three basic dimensions of human development: a long and healthy life, access to knowledge and a decent standard of living (Human Development Report, 2010).

I will conduct a bivariate analysis of the relationship between the predictors (independent variables) and child labor rates (dependent variables) of each country. I will also be looking at the percentages of boys and girls working separately as in my literature review, I note that cultural attitudes influence investment in one sex. For instance, if boys are more valued in a

nation, then there will be a greater investment in education for boys, thus affecting the percentages of boys working. Finally, I will conduct a multiple regression analysis in order to determine if a country's Gross Domestic Product influences child labor and if there is still significant correlation once other variables are introduced.

Findings

Quantitative Analysis

Table 1a (refer to the appendix) illustrates the correlations between the percentage of girls working and the other variables included in the model. GDP per capita divided by 1000, literacy rates, percent of population in rural settings, total fertility rate, life expectancy, and percent of women in the labor force all were highly correlated with percentage of girls working ($p<.001$). Population size and average years of schooling did not have a significant correlation with the percentage of girls working. As HDI measured average years of schooling and life expectancy, it was removed as a predictor variable since it measured variables already accounted for.

Table 1b (refer to the appendix) illustrates the correlations between the percentage of boys working and the other variables tested against it. Literacy rates, the human development index, percent of population in rural settings, total fertility rate, life expectancy, and percent of women in the labor force all were significantly correlated with percentage of boys working ($p<.001$). GDP per capita was shown to be correlated with boys working at the $p<.01$ level. Population size and average years of schooling did not have a significant correlation with the percentage of boys working. Table 1c (refer to the appendix) contains the descriptive statistics for the dependent and independent variables. The table indicates that the percentage of boys working (20%) is a little higher than the percentage of girls working (17%)

Figure 1 presents the relationship between GDP per capita and the percentage of girls working. Figure 1 displays a negative relationship between the two variables. GDP per capita is listed along the x-axis and percentage of girls working is located along the y-axis. The negative relationship indicates that as GDP per capita increases, the percentage of girls working decreases.

Figure 1.
girls working vs.

Percentage of
GDP per capita
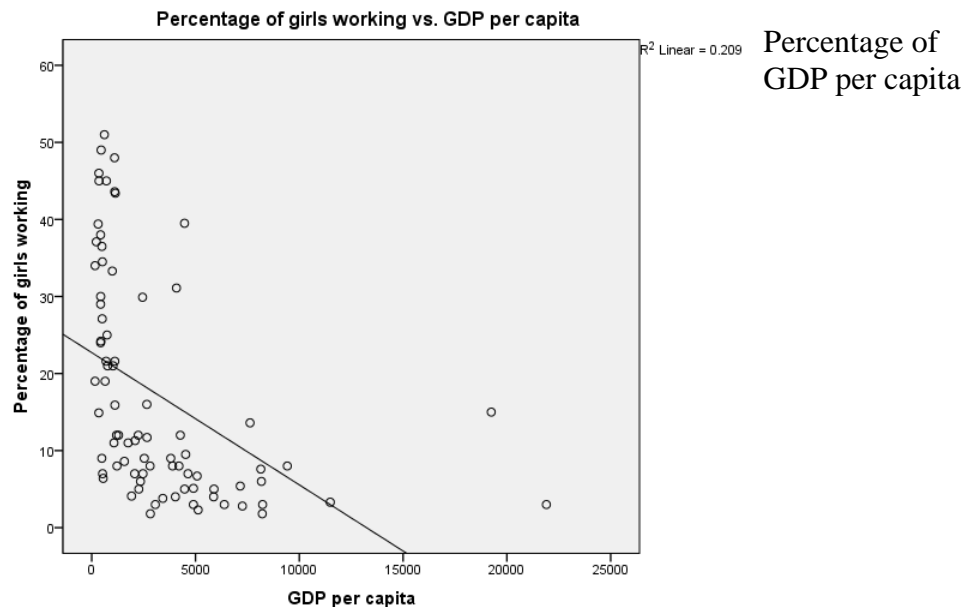
The relationship between GDP per capita and the percentage of boys working is presented in Figure 2. This bivariate presentation shows a negative relationship between the two variables. GDP per capita is listed along the x-axis and percentage of boys working is located along the y-axis. The negative relationship indicates that as GDP per capita increases, the percentage of boys working decreases. This is the same pattern as found with GDP and percent of girls working; however, it is apparent that the correlation is much higher for girls than boys. This can confirm the idea that when one sex is valued over the other, more time, energy and investment in education will be awarded to that particular sex.

Figure 2. Percentage of boys working vs. GDP per capita
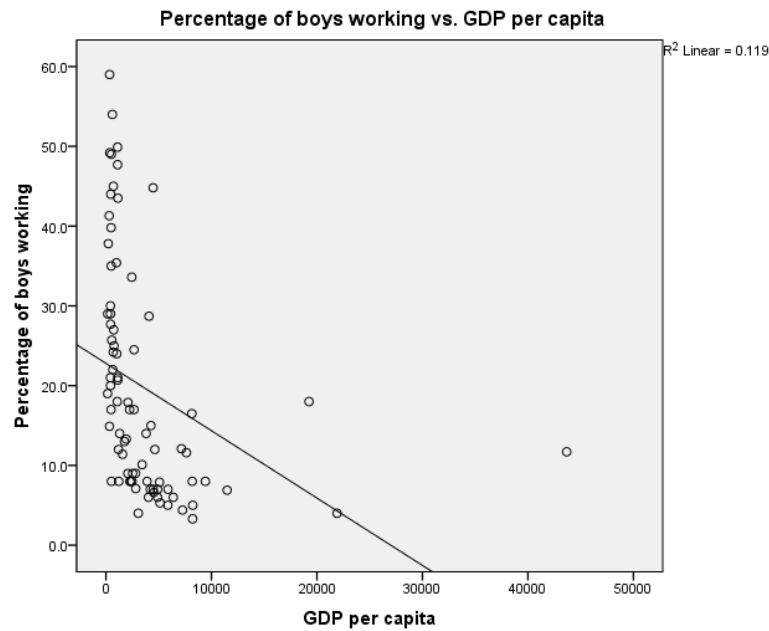
Table 2 presents the regression of the dependent variable, percentage of girls working, on the independent and control variables. However, the variable HDI was removed from the regression model as it measures life expectancy and average years of schooling, variables that are already being measured. Model 1 includes the economic variable Gross Domestic Product per capita which is significant ($p<.001$). The relationship between GDP per capita and the percentage of girls working is negative; as GDP per capita increases, the percentage of girls

working decreases. Model 2 includes population demographic variables. In this model, the variable total fertility rate is the only significant variable (p<.05). The positive relationship between these variables shows that as total fertility rate increases, the percentage of girls working increases. Model 3 includes opportunity variables. The only significant variable is percent of women in the workforce (p<.01). The positive relationship between both variables indicates that as the percent of women in the workforce increased, the percentage of girls working increased as well.

Table 2. Regression of dependent variable, percentage of girls working, on independent variables	Model 1			Model 2			Model 3		
	B	Beta	Sig.	B	Beta	Sig.	B	Beta	Sig.
GDP per capita divided by 1000	-1.683	-.444	***	-.532	-.141		-.543	-.143	
Pop. Size				.000	-.046		.000	-.035	
Percent of pop in rural setting				.061	.091		.025	.037	
Life Expectancy				-.215	-.151		.025	.017	
Total Fertility Rate				3.801	.396	*	3.004	.313	
Percent of Women in Labor Force							.244	.280	**
Literacy Rates							-.190	-.235	
Avg Years of schooling							.126	.047	
Constant	22.746		.000	16.627		.454	6.971		.791
R^2		.187			.421			.479	

*p <.05   **p <.01   ***p <.001

The regression of the dependent variable, percentage of boys working, on the independent and control variables is show in Table 3. Model 1 includes the economic variable GDP per capita which is a significant predictor of percentage of boys working (p<.01). The negative relationship indicates that as GDP per capita increases, the percentage of boys working decreases. Model 2 includes population demographic variables. Similarly to the girl's linear regression model, total fertility rate was the only significant predictor of the percentage of boys working (p<.001). The higher the fertility rate in a country, the higher the percentage of boys working will be. Model 3 adds opportunity variables. Three variables are significantly related to the percentage of boys working: total fertility rate (p<.05), percent of women in the labor force (p<.01) and literacy rates (p<.05). The positive relationship between percent of women in the labor force and percentage of boys working indicates that as the percent of women in the labor

force increases, the percentage of boys working increases as well. Contrary to the girl's linear regression model, literacy rates are a significant indicator of percentage of boys working. The effect of literacy rates, however, goes in the opposite direction and shows that as literacy rates increase, the percentage of boys working decreases.

Table 3. Regression of dependent variable, percentage of boys working, on independent variables	Model 1			Model 2			Model 3		
	B	Beta	Sig.	B	Beta	Sig.	B	Beta	Sig.
GDP per capita divided by 1000	-.820	-.336	**	-.121	-.049		-.149	-.061	
Pop. Size				.000	-.041		.000	-.050	
Percent of pop in rural setting				.122	.185		.079	.120	
Life Expectancy				.080	.057		.302	.215	
Total Fertility Rate				5.460	.570	***	3.856	.402	*
Percent of Women in Labor Force							.234	.267	**
Literacy Rates							-.273	-.338	*
Avg Years of schooling							.106	.040	
Constant	22.954		.000	-9.679		.664	-7.453		.776
R²		.101			.411			.482	

*p <.05   **p <.01   ***p <.001

Case Studies

For these case studies, I will individually analyze countries with the highest and lowest child labor rates. In addition, I will evaluate what policies and measures are implemented as a means of managing and reducing child labor.

Chad was the country listed with the highest rate of child labor—with 51% of girls working and 54% of boys working (Child Info, 2011). Chad's population consists of 11,206,152 people (World Bank, 2011). 46% of the population is literate. Literacy rates are significantly related to percentage of boys and girls working. Literacy rates can provide a better understanding of the education opportunities available. The lack of education opportunities helped to contribute to higher percentages of boys and girls working. Chad produced a measurement of .295 on the Human Development Index (Human Development Report, 2010). The closer the number is to 1, the more developed the country. Since Chad measured closer to 0, they are viewed to be as underdeveloped in the dimensions of access to knowledge, a long and healthy life, and a decent standard of living.

The average number of years of schooling for individuals in Chad is 1.5. Although the variable average years of schooling was not a significant indicator of the percentages of children working, it is apparent that it is still a very low number which reflects a lack of education opportunities. With 73% of the population residing in rural settings, there was a significant correlation as percentage of population in rural settings increased, so did the percentage of the children in the workforce. Chad's total fertility rate is 6.1 and the overall life expectancy is 49 years old. The variables life expectancy showed a significant correlation with the percentage of children working and the variable total fertility rate (TFR) showed a significant relationship with child labor rates as well. As life expectancy decreased and TFR increased, percentage of boys and girls working increased. According to the regression analysis, percentage of women in the workforce had a positive relationship with percentage of boys and girls working. Since 63% of women participate in the work force, a larger percentage of boys and girls would engage in the labor force as well.

The values for the different variables testing for a relationship with child labor rates depict Chad as a less developed nation. The lower development level of a nation can result in a greater likelihood that poverty is a contributing factor to more children working as a means of supplementing household incomes. The Labor Code in Chad establishes the minimum age for employment in Chad at 14 years and the minimum age for apprenticeships at 13 years. (United States Department of Labor, 2010). Education is compulsory starting at the age of 6 years for the duration of 9 years, but it is not readily enforced. It is difficult to enforce these laws due to lack of officials allocated for these tasks. The government has focused its attention on education reform as a tactic to improve conditions. Articles 35 to 38 of the Constitution of March 31, 1996 announced that all citizens are authorized to free secular education and training. Although they want to make education free, parents are still held accountable for paying for items necessary for school such as books and uniforms. The government proposed a National Action Plan for Education For All that strives to provide free and compulsory primary education for all children, especially girls, by 2015. This would help to eliminate gender disparities between boys and girls in education.

Turkey was the country listed with the lowest rate of child labor—with 1.8% of girls working and 3.3% of boys working (World Bank, 2011). Turkey's population is 74,815,703. Ninety-eight percent of the population is literate and they have a measurement of .679 on the

Human Development Index (Human Development Report, 2010). The average number of years of schooling is 6.5 and 31% of the population resides in rural settings. The total fertility rate is 2.1 and the overall life expectancy is 72 years old. 24% of the women are engaged in the workforce.

Individually analyzing all of these variables, it places Turkey at a higher developmental level than the Chad. The high literacy rate and average years of schooling indicates that there are more available education opportunities. As Turkey measures closer to 1 on the HDI, they are considered to be a more developed nation. Also, with a lower percentage of the population residing in rural settings there is less of a chance that children are working. The quantitative findings for the current study show that there is a correlation with high percentage of rural inhabitants and high percentages of children working. Although Turkey has an overall low child labor rate, it is ranked by the ILO as the third worst out of 16 countries in terms of weekly work hours for children (World Socialization Website, 2010). Child laborers in Turkey work on average 51 hours per week. A large proportion of the working children belong to two of the most marginalized groups, the Kurdish and Roma communities. This is an example of the difficulty of making sense of the information gathered in each country. While Turkey may appear to be a developed nation in terms of child labor, there are clearly issues involving the number of hours that children work. This information gets lost when the focus is only on the percentage of children working.

From the time period of 1993 to 1998, many families from the Roma and Kurdish communities were forced from eastern parts of the country into larger cities located in the west. As a result, many families ended up settling in shantytowns and are still enduring impoverished conditions to this day. Unfortunately, a method to try and escape their poverty is putting children to work as there is no welfare system to protect children's rights. In June 2003, the Turkish government enacted a new labor law that established the minimum age for employment at 15 years and allowed children up to the age of 14 to perform light work that does not disrupt their education (United States Department of Labor, 2010). In addition, it gives governors in provinces that depend on agriculture the flexibility of declaring the minimum age to work. In order to counteract this problem, the government has established several short-term solutions such as handing out free coal and food to the poor. Before any child can begin a job, they must have a physical examination done every 6 months. Children who have completed their education and are 15 years of age are allowed to work up to 7 hours a day and not surpassing 35 hours a week. Children that are 16 years old are allowed to work up to 8 hours a day and up to 40 hours a week.

The Ministry of Labor and Social Services (MOLSS) Inspection board are primarily responsible for establishing and enforcing child labor laws. In 2004, they organized a list of jobs suitable for children under 18 years old. For instance, they listed bars, coffee houses, dance halls, cabarets, casinos, public baths or industrial night work as unsuitable job sites or occupations. However, the MOLSS has been unable to enforce a large amount of the child labor laws for numerous reasons including traditional attitudes, socio-economic factors, and the overarching acceptance of child labor. As a result, the Inspection Board has concentrated their efforts on improving working conditions as a method of protecting working children.

In Turkey, there are other regional child labor elimination programs in progress that are supported by the local and national level authorities. There are currently 28 government-operated

centers directed at helping working street children. The Interior Ministry's Child Police are responsible for protecting children from employer abuses and, in Diyarbakir, they offer nutrition and swimming courses over the summer when children are most vulnerable to working in the streets. In Konya, computer literacy courses and organized soccer and tennis activities were provided to the children who otherwise would be actively participating in the workforce. These programs are aimed at eradicating the incidence of child labor by employing a series of preventative methods. Although these methods are in place, the situation of working children still remains to be bleak.

<u>Discussion</u>

Although the correlation matrix showed that a majority of the variables were significantly correlated with the percentages of boys and girls working, it also disproved my hypotheses about population size and average years of school being significantly correlated with child labor rates. I hypothesized that GDP per capita, percent of women in the labor force, literacy rates, average years of schooling, and life expectancy will all have a negative relationship with children working. Also, I hypothesized that TFR and percent of population in rural settings would have a positive relationship with children working. The linear regression model further disproved several more of my hypotheses by only indicating GDP per capita, TFR, percent of women in the workforce, and literacy rates as significant predictors of percentages of girls and boys working. Furthermore, I had to eliminate the HDI variable from the model because it measured literacy rates, average years of schooling and life expectancy at birth, which are variables that are already included in the regression models.

In the first model, GDP per capita proves to be significant for both the girl's and boy's models. In the second model, however, GDP per capita loses strength and significance as population demographic variables are included. These variables are typically used to describe the structure of a nation and can be influenced by GDP. TFR is the only variable that is significant at the $p<.05$ level for the girl's model and significant at the $p<.001$ level for the boy's model. What this shows is that since GDP per capita may be partially explained by the other variables introduced in the model, it will lose explanatory power. In this model, TFR is the best predictor of child labor rates. In the final model, opportunity variables including education opportunities and job opportunities for women are presented. Again, GDP per capita does not show a significant relationship for both the girl's and boy's models. Total fertility rate loses significance in the girl's model but remains significant at the $p<.05$ level for the boy's model. There is a vast difference between the girl's model and the boy's once the opportunity variables are introduced.

The variable percent of women in the labor force gains significance in both models, at the $p<.01$ level for both of the girl's and boy's models but another variable becomes significant in the boy's model that does not achieve significance in the girl's model. The variable literacy rates becomes significant at the $p<.05$ level and is almost significant in the girl's model. However, there seems to be quite a few conflicting reasons as to why some variables are significant in the boy's model and some are not significant in the girl's. For instance, because of the relatively small number of countries with data available, the relationship is not as pronounced as it would be if more countries were included. In addition, in my literature review, I discuss the

discrepancies between what is considered work and how the disregard for domestic work as work ultimately perpetuates the idea that boys engage in the labor force more than girls.

An important relationship to acknowledge is that half of the variables that proved to be significant are attributed to women. Total fertility rate measures the average number of children a woman will bear in her lifetime and percent of women in the labor force provides a description of the proportion of women working. This illustrates the influence that the status of women in a country can have on child labor rates. With a high total fertility rate, there is a greater likelihood that children will be working. The significant relationship between TFR and percentages of children working supports my hypothesis that the higher a country's TFR is, the higher child labor rates will be. Families that have more children are more likely to do so because they live in rural settings and invest their energy in having children and putting them to work in order to help supplement household income as they grow older. Children are seen as a source of caretaking when parents become too old to care for themselves. With increased opportunities available for women, they wouldn't need to have so many children to work in the fields. Instead, they can focus their time on becoming educated or working, which leads to the next significant variable. Contrary to my hypothesis, as the percentage of women working increased, so did the percentage of children working. At first, I predicted that with a higher percentage of women working, there would be less of a need for children in the workforce. However, the linear regression model and correlation matrix tell a different story and express that in actuality, as the percent of women increases, so do the percentages of children working. This relationship can be due in part to the type of work women are doing. For instance, if they are taking part in largely agriculture work, then it seems only sensible that children would be expected to work as well. This also indicates that there is a relationship between the status of women and children. This is another one of those highly complex relationships including what is considered work and what is being reported as work. In many places, high status women do not work outside of the home and, therefore, only poorer women who also need to have their children in the labor force are employed.

For my case studies, I examined Chad and Turkey as two examples of countries with and high and low incidents of child labor. Although Chad has a very high child labor rate, Turkey ranks higher in terms of hours per week that children work. This was an incredibly interesting find, but then again, there was hardly data available on child labor rates from most developed nations. This individual analysis allows us to compare the different rates and establish patterns we normally can't determine with a model comparing numerous countries. Although a small percentage of children are working in Turkey, the children that are working are working 30+ hours a week. When comparing policies in place and efforts to combat child labor in both countries, it becomes apparent that a greater effort is being made in Turkey as they have an entire task force dedicated to creating and enforcing child labor laws. Although there is a labor code established in Chad and Turkey has the Ministry of Labor and Social Services, both seem too difficult to enforce. Other measures have been taken as a means to try and curb child labor rates such as the education initiative in Chad and the government operated centers directed at helping working street children over the summer and providing courses to help keep them off the street.

The overarching themes between both countries are that education, attitudes, and socioeconomic factors play major roles in influencing the frequency of children working. In Chad, although education is free, families still face the burden of having to pay for uniforms and books. This could prove to be a problem as most impoverished households are unable to afford

the extra costs. If families must pay for their children to go to school, the likelihood that children will escape poverty through education becomes less probable. Chad is an example of a nation that still faces education inequality not only among the rich and poor, but among boys and girls as well. Unless this gender disparity is eradicated, the future looks bleak for female advancement in society and, as I mentioned before, the status of women has an impact on the percentages of children working.

In Turkey, the marginalization of the Roma and Kurdish communities has resulted in forcing families to live in impoverished conditions. Since there is no welfare system to protect children's rights and since labor laws are difficult to enforce, children are put to work to help support the family. The attitudes toward these communities help to contribute to the increasing child workforce. As a majority of the children that make up the small percentage of children working are from these ostracized communities, the ability to cut child labor rates lies within changing society's attitudes. This process requires efforts from all citizens to stop the discrimination against the Roma and the Kurds. This attitude shift will ultimately help in the fight to keep children out of the workforce and in school.

Limitations

I encountered several problems along the way as I collected data for each variable from each country. Through the different sources and outlets of information, data were not consistent from source to source. Also, some information was not up-to-date. In some instances, there would be information available from countries dating in the past year or 2 years. However, in other instances, the most recently updated data for a certain country could date back a decade. This inconsistency and outdated information could skew my data and provide us with inaccurate findings. In addition to outdated information, some developed countries did not report child labor rates. This is not to say that there are not children working in these countries, but it also impacts my research by only providing me with information from mostly developing nations and a small amount of developed nations. If more data was available, then my findings could have more accurately portrayed the current situation of child labor globally.

Conclusion

The complicated relationship between child labor and poverty interconnects with numerous factors such as societal attitudes, social acceptance of the problem, education opportunities and much more. However, a majority of the misunderstandings of the frequency of child labor stem from a poor recording system of labor rates, a vague definition of exactly what is considered to be labor and a mediocre distribution of household surveys for measurements. A better system of gathering data could aid in the development of solutions. There is no singular solution to eliminating the problem of children working; however, there are numerous ways to tackle the problem. As mentioned in the literature review, some children believe that if they don't work, their family will starve. If there were increases in the wages parents earn, children wouldn't feel the need to have to work or else their family would go hungry. In the dimension of education, if more funding was allocated to ensuring that education is completely free, parents

would not need to withdraw their children because they cannot afford to pay for books or school uniforms.

Cultural attitudes might have the biggest impact on child labor rates as some societies might believe it is an acceptable practice. Instead of trying to shift the attitude to a more a Westernized one, it is important that these societies see that education is a solution to breaking the poverty cycle. In reference to the literature review, it was noted that some cultures believe that 'Victorian' style education hinders children's abilities to learn trades that would prove useful to them if they reside in a rural setting. A method that can be used to assuage this unease about education for children is to provide courses that can help reinforce useful trades such as farming or sewing. Finally, cultural attitudes also have an effect on how women are treated. If women were viewed globally as a valuable part of society, families would invest their time and energy into educating daughters instead of simply educating their sons. With more children becoming educated, imagine the potential for future innovations and solutions to global problems.

Table 1a. Correlation Matrix of Percentage of girls working and other variables

Correlations

	Percentage of girls working	GDP	Pop. Size	Literacy Rates	HDI	Avg Yrs of Schooling	Percent pop in rural setting	TFR	Life Expect.	Percent of Women in Labor Force
Percentage of girls working	1									
GDP per capita	-.457 ***	1								
Pop. Size	-.073	-.062	1							
Literacy Rates	-.568 ***	.431 ***	-.067	1						
Human Development Index	-.670 ***	.717 ***	-.016	.769 ***	1					
Avg Yrs of Schooling	-.140	.367 ***	-.056	.466 ***	.504 ***	1				
Percent pop in rural setting	.480 ***	-.532 ***	.086	-.522 ***	-.750 ***	-.437 ***	1			
Total Fertility Rate	.647 ***	-.495 ***	-.061	-.779 ***	-.864 ***	-.402 ***	.578 ***	1		
Life Expectancy	-.615 ***	.620 ***	.012	.691 ***	.924 ***	.375 ***	-.635 ***	-.855 ***	1	
Percent of Women in Labor Force	.470 ***	.007	-.056	-.105	-.279 ***	-.003	.275 ***	.258 **	-.315 ***	1

$*p < .05$ $**p < .01$ $***p < .001$

Table 1b. Correlation Matrix of Percentage of boys working and other variables

Correlations

	Percentage of boys working	GDP per capita	Pop. Size	Literacy Rates	HDI	Avg Yrs of Schooling	Percent pop in rural setting	TFR	Life Expect.	Percent of Women in Labor Force
Percentage of boys working	1									
GDP	-.345 **	1								
Pop. Size	-.071	-.062	1							
Literacy Rates	-.614 ***	.431 ***	-.067	1						
Human Development Index	-.644 ***	.717 ***	-.016	.769 ***	1					
Avg Yrs of Schooling	-.180	.367 ***	-.056	.466 ***	.504 ***	1				
Percent pop in rural setting	.497 ***	-.532 ***	.086	-.522 ***	-.750 ***	-.437 ***	1			
Total Fertility Rate	.654 ***	-.495 ***	-.061	-.779 ***	-.864 ***	-.402 ***	.578 ***	1		
Life Expectancy	-.575 ***	.620 ***	.012	.691 ***	.924 ***	.375 ***	-.635 ***	-.855 ***	1	
Percent of Women in Labor Force	.432 ***	.007	-.056	-.105	-.279 ***	-.003	.275 ***	.258 **	-.315 ***	1

*p <.05   **p <.01   ***p <.001

Table 1c.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Percentage of girls working	81	2	51	17.15	14.333
Percentage of boys working	82	3.3	59.0	19.640	14.3492
Pop. Size	147	20398	1331460000	43026007.34	1.488E8
Literacy Rates	147	22	100	87.53	16.112
Human Development Index	133	.140	.938	.63341	.193792
Avg Yrs of Schooling	136	1.2	48.1	7.907	4.6207
Percent pop in rural setting	147	0	100	43.52	23.118
Total Fertility Rate	144	1.2	7.1	2.900	1.4334
Life Expectancy	144	44	83	68.64	10.735
Percent of Women in Labor Force	136	14	91	53.93	15.071
GDP per capita divided by 1000	147	.16	79.09	12.0967	16.27859
Valid N (listwise)	76				

List of Countries

Afghanistan	Djibouti	Morocco
Albania	Dominican Republic	Mozambique
Algeria	Ecuador	Namibia
Angola	Egypt	Nepal
Argentina	El Salvador	Nicaragua
Armenia	Ethiopia	Niger
Azerbaijan	The Gambia	Panama
Bahrain	Georgia	Paraguay
Bangladesh	Ghana	Peru
Belarus	Guatemala	Philippines
Belgium	Guyana	Portugal
Bosnia and	Haiti	Rwanda
Herzegovina	Honduras	Senegal
Brazil	India	Serbia
Burkina Faso	Indonesia	Sierra Leone
Burundi	Iraq	Sri Lanka
Cambodia	Jamaica	Sudan
Cameroon	Kazakhstan	Suriname
Cape Verde	Kenya	Swaziland
Central African	Lebanon	Tanzania
Republic	Lesotho	Thailand
Chad	Liberia	Togo
Colombia	Madagascar	Turkey
Democratic Republic	Malawi	Uganda
of Congo	Mali	Ukraine
Costa Rica	Mauritania	Uruguay
Cote d'Ivoire	Mexico	Venezuela
	Mongolia	Vietnam
		Yemen
		Zambia

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Do Biological Measures Add Predictive Value in Screening for Stable Aggression in Children?

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Abstract

The consequences associated with early onset aggression illustrate the importance of early intervention. In order to maximize the cost effectiveness of intervention, screening procedures must predict which children need intervention and which children do not. A staged screening may improve current procedures which maximize sensitivity and thus, risk over-inclusion of healthy children. Electroencephalogram (EEG) research has shown patterns in frontal brain activity related to individual characteristics and emotion experience. EEG data will be examined to determine if biological markers of neural function prospectively differentiate between children at risk for stable aggressive behavior and those whose aggression is temporary.

Introduction

Aggression is a major societal and individual health concern. Aggression encompasses behaviors that have the potential to inflict physical or emotional harm on others (Loeber & Hay, 1997). In children, these behaviors often include direct physical aggression toward other children and adults. Early onset direct aggression can persist into adolescence and adulthood, leading to future maladjustment (Brennan, Hall, Bor, Najman, & Williams, 2003). In fact, as children age, the likelihood of continued aggressive behavior increases (Connor, 2002; Farrington, 1991). Even though half of aggressive males ages 8 to 10 decrease in aggression by the age of 32 (Farrington, 1991), adult aggression is almost always preceded by a history of childhood and adolescent aggression (Sampson & Laub, 1993). Additionally, as problems related to aggression accumulate, older children are less responsive to treatment (Kazdin, 1995; Ruma, Burke, & Thompson, 1996). Some even suggest that antisocial behavior present in middle childhood may not be reversible (Mash & Wolfe, 2010). This stated, early intervention is necessary to maximize the possibility of preventing lifelong aggression and antisocial behavior.

Because early onset aggression is strongly correlated with stable lifelong antisocial behavior, the expression of aggression at a young age is a relatively overt and observable indicator of risk. Therefore, interventions that aim to prevent lifelong antisocial behavior use the presence of early onset aggression as a criterion for entry. However, the fact that half of individuals desist from aggression by adulthood presents a challenge in effective screening. Over-inclusion of individuals incorrectly labeled as "at risk" for lifelong aggression may present

risks and costs. This study explores the predictive value of a staged screening process that utilizes physiological measures in addition to a behavioral screen.

The Consequences of Aggressive Behavior

  Early onset aggression is strongly linked to future externalizing problems, such as more serious violence, delinquency, conduct disorder, and substance abuse (Broidy et al., 2003; Card, Stucky, Sawalani, & Little, 2008). These externalizing problems are also associated with potential difficulties in academic and job settings (Kaplow, Curran, Dodge, & Conduct Problems Prevention Research Group, 2002). Furthermore, early onset aggression is associated with peer rejection, which can lead to internalizing problems, such as depression and anxiety (Card et al., 2008; Tremblay et al., 2004; DeRosier, Kupersmidt, & Patterson, 1994). The accumulation of these problems over time further constrains personal growth by reducing opportunities for positive, prosocial influences from adults and peers.

  In addition, aggressive behavior presents social and financial consequences for the community. For example, violence damages individuals' perception of safety. It is also associated with significant costs related to medical and psychological treatment, property repair, legal proceedings, incarceration and rehabilitation (Frick, 2001). By the time individuals are involved in the legal system (as juvenile or adult offenders), rehabilitation is notoriously ineffective. A cycle of illegal behavior and poor rehabilitation can yield limited social and occupational opportunities for positive life trajectories and reinforce a pattern of antisocial behavior. Therefore, intervening in the process before aggressive behavior becomes a self-sustaining strategy is both financially and socially beneficial.

Intervention and Screening Procedures

  The accumulation of adverse outcomes associated with early onset aggression highlights the importance of effective preventative childhood interventions. Aggression present at age 4 can predict 51% of the variance in aggression at middle adolescence (Connor, 2002). Because aggression by adolescence is more strongly related to adult aggression; early interventions must address young children before aggressive behavior continues and increases in severity (Brennan et al., 2003).

  Universal interventions, aimed at every child in a classroom, can decrease individual aggression (Payton et al., 2008). However, these programs are costly in terms of supplying program materials and taking time out of the school day from children who are not aggressive or who will desist from aggression naturally over time (Farrington, 1991). Indicated programs, on the other hand, are cost effective because they only target children who already display aggressive behavior and are at risk for chronic aggression. They are also more intensive and tailored to the individual child's behavioral patterns.

  The problem with indicated interventions arises in determining which children should be included in the program. Because indicated programs only attend to a subset of children, selection into the program introduces a labeling process by which children could be stigmatized. Disclosure of the results of behavioral screens permits and reinforces a frame of mind in which parents and teachers will view a child for years to come. Peer suspicions of a child's participation in an intervention will also affect a child's present and future interactions. The stigma and expectation of aggression from others can provoke aggressive responses, a phenomenon commonly referred to as self-fulfilling prophecy. Thus, screening strategies that routinely include children who are not in need of intervention risk stigmatization, which could

adversely alter the child's development. Screening procedures should be as precise in predictive validity as possible.

Unfortunately, it is difficult to know in early childhood which children will demonstrate stable and continuous aggression over the ensuing decades of their lives, and which children will naturally desist from aggression. Therefore, intervention is likely to be most effective at a time when accurately identifying those in need is most difficult. Because early onset aggression is strongly related to later aggressive behavior, children on a trajectory of lifetime aggression will be highly likely to be identified through this screening strategy. These children would be considered "true positives". Furthermore, children who do not show aggressive behavior and who continue this trajectory are considered "true negatives". However because early onset aggression does not predict lifelong aggression with 100% accuracy, both "false positives" and "false negatives" will also exist. False positives are those children showing early aggression but who will naturally desist from aggression in the future. False negatives are those children displaying no aggressive behavior, but who develop future aggression, however, this phenomenon is relatively rare.

True positives are the most likely to benefit from the indicated intervention. Similarly there is a financial benefit to excluding true negatives from intervention. While the aforementioned group distinctions indicate effective program implementation, the existence of false positives and false negatives introduces disadvantages. False negatives can bring about social and financial costs associated with unrecognized aggression. However, the consequences associated with false positives are more likely to occur because screening for early onset aggression implies that as many as 50% of identified children are not true positives. The disadvantages of this group membership include both the financial cost of providing the program unnecessarily, and the risk of contributing to stigma and self-fulfilling prophecy (see above; Frick, 2001).

Qualities of Assessments

Two qualities of assessments influence the proportion of children that comprise each group: sensitivity and specificity. Sensitivity refers to the proportion of true positives accurately identified from the total number of individuals with lifelong aggression. Similarly, specificity refers to the proportion of true negatives accurately identified from the total number of individuals who eventually desist from aggression. In changing the thresholds of these attributes, the proportions of individuals comprising the four groups change. However, because sensitivity and specificity are inversely related, an increase in one domain compromises the other. An ideal screening procedure would maximize the number of true positives and true negatives while minimizing the number of false positives and false negatives. This requires a challenging balance of sensitivity and specificity.

Limitations and Biases of Behavioral Assessment

Screening procedures utilize a number of behavioral assessments ranging from trained observer assessments and parent or teacher reports to self-reported behavior questionnaires. In the case of childhood aggression, a commonly used assessment is the teacher report, often a questionnaire solely about classroom behavior. These reports are advantageously inexpensive and concise, but can be complicated by limitations and subjective factors. Behavioral screening may identify and provide many healthy children with a costly and unnecessary intervention. Many children entering kindergarten may have difficulty adapting to the new environment,

experience anxiety, and react aggressively to the situation. A screening for early onset aggression may indicate that these children are aggressive. However, the same screening procedure, given at the end of the school year might reveal normative aggression levels, indicating no need for intervention. As for all single time-point screenings, the information collected can be an effect of confounding and changing circumstances. Aggression at the time of screening cannot always predict lifelong aggression.

In addition to the timing confound, teacher-report assessments can also be affected by observer biases. Different teachers define aggressive behaviors differently, and are more likely to recognize aggressive behaviors in children of whom they already have a negative impression. While behavioral measures attempt to measure objectively, subjectivity is always a concern. Even though behavioral assessments are cost effective and easily administered, they can be ineffective due to the aforementioned limitations and subjective complications.

Staged Screening

In an effort to identify many children with lifelong aggression and exclude children with temporary aggression, interventions can use a staged screening procedure. A highly sensitive first stage of screening can ensure inclusion of many children with aggressive behavior. A short teacher-reported questionnaire can serve as this sensitive screener because it is time and cost effective. This first screener can produce two subsets of children in a classroom, those who are currently perceived as aggressive and those who are not. In an attempt to limit the indicated intervention group to only children at risk for lifelong aggression, the second phase of screening can be much more specific. This study attempts to test the value of psychophysiological measures as the second phase of screening for chronic aggressive behavior in children.

Electroencephalography

The use of psychophysiological assessments may add specificity to behavioral assessments. One form of psychophysiological assessment that has been used to study the physiological correlates of individual differences in behavioral tendencies is electroencephalography (EEG). EEG is a measure of surface brain activity through amplification of electrical signals. These signals are recorded from electrodes placed on the scalp above different areas of the brain. Waveforms in the electrodes indicate activity in specific cortical regions: the frontal, parietal, occipital, and temporal lobes. Because EEG records this activity and demonstrates millisecond resolution, it is appropriate for examining responses to emotional stimuli. Much of the literature shows distinct brain responses to different types of emotion. Considering that lifelong aggression may be related to emotion experience and emotion regulation in certain situations, there may be a relationship between brain activity during emotion-inducing situations and aggressive behavior. Differences in this psychophysiological measure during emotion induction may contribute to the differentiation between children displaying persistent and transient aggression.

Frontal EEG asymmetry is a quantification of brain activity that is frequently studied in relation to emotional experiences. It is defined as the magnitude of difference in activation between the frontal regions of the right and left hemisphere. Activation is measured as the inverse of EEG-recorded alpha band power. Alpha power refers to the brain activity oscilating withing a specific frequency band, typically 6 – 9 Hz in preschool aged children (Marshall et al., 2002). Brain activity at this frequency is correlated with drowsiness or less cognitive engagement. Accordingly, the hemisphere with lower alpha power is considered higher in

activation. Thus, greater left alpha power indicates right asymmetrical frontal activation, while greater right alpha power indicates left asymmetrical frontal activation.

This asymmetrical activation can be studied in two ways; through lateralization of asymmetry, and magnitude of asymmetry. Lateralization is a categorization of either more prominent left or right activation. Magnitude is the degree of difference between left and right hemispheric activation. As Davidson (1988) highlighted, magnitude can reveal group differences in asymmetry due to the degree of greater or lesser activation of a hemisphere, whereas laterality cannot.

Emotion Experience and EEG Asymmetry. Research indicates that frontal asymmetry is associated with both affective experience (Davidson, 1992) and the motivational direction driving behavior (Harmon-Jones, 2004). A review by Davidson (2004) suggests that right frontal activation is associated with emotions that accompany withdrawal behaviors in many participants. These emotional states include negative valences such as sadness, fear or disgust (Jones & Fox, 1992). On the other hand, left frontal asymmetry is associated with experiencing affective states that accompany approach behaviors (Davidson, 2004). Originally, left frontal asymmetry patterns were considered to exclusively reflect positive emotions (Jones & Fox, 1992; Fox, 1991). Many studies have now shown that anger-inducing stimuli may also generate left asymmetries despite its negative valence (Harmon-Jones & Allen, 1998; Sutton & Davidson, 1997; Rybak, Crayton, Young, Herba, Konopka, 2006; Harmon-Jones & Sigelman, 2001). This is thought to result from the approach motivation that generates behavioral responses aimed at resolving the anger-inducing situation (Harmon-Jones, 2004; Harmon-Jones & Allen, 1998; Davidson, 2004). While the causal direction of EEG asymmetry and emotion response remains unknown, frontal asymmetry may be a potential screening tool. Because previous research indicates right and left asymmetries are associated with withdrawal and approach motivations, abnormal asymmetrical activation may indicate atypical responses to emotional stimuli. Coan and Allen (2004) have also suggested that asymmetry facilitates the experience of the emotion. Thus, absence of the standard pattern of reactivity may affect emotional response (Coan & Allen, 2004). Emotion conditions such as sadness and fear are advantageous in examining brain asymmetry patterns of individuals with aggression, because they are consistently associated with right activation and withdrawal motivation in normal individuals (Fox, 1991). Therefore, deviation from this pattern may indicate atypical emotional response.

Resting State EEG Asymmetry. Interest in the difference behavioral motivation related to brain asymmetrical activation prompted research into emotion predisposition and resting brain activity. Resting right frontal laterality is associated with more withdrawal and inhibitory tendencies (Sutton & Davidson, 1997). Interestingly, right asymmetry is significantly more common among individuals with depression, and even among those whose depression has been in remission for a year (Henriques & Davidson, 1990). On the other hand, studies have found a strong correlation between resting left activation and stable positive disposition as well as higher approach tendencies (Sutton & Davidson, 1997; Tomarken, Davidson, Wheeler, & Doss, 1992). Harmon-Jones and Allen (1998) have also shown that more frequent aggressive behavior is associated with resting left frontal laterality. The association of left activation with both positive disposition and trait aggression show additional support for the relationship between left activation and approach motivation. While EEG measures are emotion-state specific they are also trait specific and may represent an underlying vulnerability to certain reactions to emotional stimuli. This vulnerability may be a risk factor for prolonged aggression.

Based on this research, EEG is a candidate for physiologically specific screeners. EEG is an objective measure that can produce consistent results and, unlike behavioral assessments, it is not skewed by observer bias. Also, EEG provides information that behavioral assessments cannot. Whereas behavioral assessments are a measure of outwardly visible behavior, EEG is a measure of internal, unobservable functioning during specific psychological experiences. However, despite its objectivity and insight into underlying biological functioning, EEG alone cannot be a screening procedure. EEG is currently used as a research tool because there is no definitive data linking patterns of brain waves and early onset aggression. Although it is a useful noninvasive psychophysiological measure in studying children, it is time and cost intensive and thus not appropriate as the first stage of screening.

The Current Study

The current study compares the frontal asymmetries of a cohort of kindergarten children identified as 'high risk' for aggression based on standard teacher-report screening procedures. Children whose aggression remained stable or increased over the year, determined by teacher report at two time points, were categorized as displaying persistent aggression. All children's EEG asymmetries were measured during resting state and while viewing fear and sad emotion-inducing movie clips. Laterality and magnitude of asymmetry were analyzed, in addition to a behavioral teacher-report and demographic variables, for their added predictive value in identifying persistent aggression over the course of a year. No hypotheses were made regarding the direction of the relationship between resting brain asymmetries and persistent aggression, given the tentative and conflicting literature on individual differences and EEG resting patterns and the lack of research linking brain asymmetries and persistent aggression. However, during the fear and sad clips, when the average person would exhibit more right asymmetry and withdrawal motivation, we expect an abnormal pattern of more frequent and greater left activation in children with persistent aggression. If these hypotheses are supported, it will prompt further investigation into staged screening utilizing physiological measures.

Methods

Participants

Kindergarten children attending a high-poverty urban school district in Pennsylvania were examined in this study as part of a larger longitudinal study on the development of aggression. However, only data from the first year of participation will be presented here. A brief survey about aggressive classroom behavior (see Appendix A) was distributed to teachers of all kindergarten classes in the Fall of 2008 and 2009. Children in the top 20% of ratings in each classroom were identified for recruitment into the study. Research staff contacted parents, explained the study, and scheduled an initial home visit.

During the home visit, parents were provided with consent forms and those who were interested enrolled in the study. Families received a $75 Visa gift card for each year of participation. Participation consisted of a home visit (in which parents and children were individually and jointly assessed), teacher-rated questionnaires, and two child assessments (at separate times during the regular school day). Children were assessed for cognitive performance and physiological functioning. To participate in the study, children were asked to assent verbally. Those who refused were returned to their classroom and approached again on a

different day. Children who refused twice were not included in the study. 207 children assented to the physiological assessment.

Half the sample was randomly assigned to a comprehensive socioemotional intervention program. However, the intervention was not completed in the time frame of the study and analyses affirmed no differences in proposed measures between the two groups at the time of testing. Thus, intervention status is not considered here and all children were included in analyses.

These procedures resulted in a sample of 207 kindergarten children. Table 1 describes the demographics of the sample. At least 52% of participating families were below the US Census Bureau federal poverty guidelines, based on family size and total income, consistent with region-specific trends. Also, consistent with epidemiological data males were over represented in this high aggression sample.

Table 1
Demographic Characteristics of the Sample

Ethnicity	%
African American	73.2
Caucasian	7.7
Hispanic	18.7
Asian	0.5
Sex	
Male	66.5
Female	33.5

Note. Participant demographics are similar to those of the region. *n* = 207

Procedure

Child Behavioral Assessment. After children were enrolled into the study, teachers filled out a more comprehensive behavioral report (Appendix B). This report is a compilation and modification of items from the Teacher Observation of Classroom Adaptation - Revised (Werthamer-Larsson, Kellam, & Wheeler, 1991), the Social Competence Scale (Conduct Problems Prevention Research Group, 1990), and children's internalizing and withdrawn behavior questions for the Head Start REDI Project (http://headstartredi.ssri.psu.edu). Data were collected at the beginning of 2009 and 2010, allowing teachers to become familiar with the children. Teachers completed the report again at the end of the school year. Children with missing teacher reports at either time point were excluded from the sample, resulting in an adjusted sample of 150 participants.

The questionnaire is composed of five constructs: Emotion Regulation, Prosocial Behavior, Social Competence, Aggressive/Oppositional Behavior, and Internalizing/Withdrawn Behavior. The Social Competence Scale encompasses the emotion regulation and prosocial behavior constructs and therefore, was not included in any analyses. Each item on the report is rated on a 6 point scale ("Almost Never" to "Almost Always"; see Appendix B). Items measuring the constructs were averaged to produce a score between 1 and 6 for each construct independently. The 7 item Aggressive/Oppositional Behavior construct was used to study the change in aggression. These include items such as "breaks things on purpose", "hits, pushes, or shoves," and "fights with other children." Scores closer to 6 indicate the presence of many aggressive behaviors.

Change in aggression was calculated for each child by subtracting the first Aggression/Oppositional Behavior score from the second Aggression/Oppositional Behavior score. Negative change scores reflect a decrease in aggression between testing, whereas positive or zero scores indicate an increase in or stability of aggression. Using these raw change scores dichotomous groups were created for further analysis. Children with negative scores were grouped as "transient" in aggression, and those with a score greater than or equal to zero were grouped as "persistent" in aggression. Children with transient aggression are thought to represent those screened into the intervention as highly aggressive but for whom aggression normalized over time without assistance (false positives). Consistent with epidemiological research, about half (48%) of the sample naturally decreased in aggression over time.

Child Physiological Assessment. In order to reduce anxiety in children, this study adopted a space travel theme. Physiological measures took place in a Recreational Vehicle (RV) outfitted to resemble a spaceship. This theme appropriately disguised electrode use in physiological testing of heart rate, skin conductance, and EEG. To increase child comfort, teachers and their classrooms were invited to tour the RV prior to the study.

Physiological measures were taken of each child individually during the school day. Research assistants (RAs) measured the circumference of the skull and placed the correct cap size on the scalp. Measurements were taken to ensure the midline of the cap aligned with the midline of the skull. After each electrode holder on the cap was filled with Signa Gel, RAs checked that impedances were below 100 ohms, and re-gelled and repositioned as necessary. RAs then attached electrodes to their corresponding holders and electroculogram (EOG) electrodes to the face. EOG electrodes were placed on the cheeks under the pupils and parallel to the pupils a centimeter from the outer edge of each eye. These ensure accurate EEG readings by accounting for EEG recording artifact due to eye movement.

Each child was prompted to relax and remain still and quiet while watching a computer monitor in front of them. The EEG task began once RAs initiated recording in the ActiView program. To induce a resting baseline state, each child was directed to watch a star-field computer screen for 2 minutes as they 'traveled through space'. Children then played a game to measure inhibitory control, followed by a second 2 minute baseline. The inhibitory control task was not included in this study. Children then watched 4 clips from the Lion King movie evoking 4 types of emotion: 2 withdrawal emotions (sad and fear) and 2 approach emotions (happy and angry). The emotion inducing clips were presented consistently in the following order: fear, sad, happy, and angry. Clips maintained their chronological position within the movie. Each clip lasted two to three minutes (dependent on the duration of one consistent emotion) and was followed by a 30 second neutral clip. Neutral clips, containing no obvious emotional quality, were selected from film in between the neighboring emotion scenes. To prevent continuation of emotions, the neutral clip also depicted resolution of the previous emotion clip. The neutral clip was then followed by 30 seconds of a fixation stimulus (a red plus sign on a while screen) in order to establish a baseline for the following emotion. The testing sessions lasted from 1 – 1.5 hours.

EEG Analysis. Continuous EEG measures were taken using Biosemi elastic head caps and the Active Two BioSemi system (BioSemi, Amsterdam, Netherlands). ActiView enabled data recording at 512 Hz from 32 scalp electrodes using the 10/20 International system, (see Figure 1; Jasper, 1958). E-Prime allowed simultaneous presentation of stimulus and signaled timed synchronized markers of the start and completion or each emotion and fixation block to the computer recording EEG (Psychological Software Tools, Inc., 2004).

After recording, the EEG data were analyzed using Brain Vision Analyzer 2.0 (Brain Products, Gilching, Germany). Data were filtered for high and low pass frequency of 0.1 Hz and 30 Hz, respectively. Artifacts were identified as any voltage step greater than 100 µV/ms between sampling points, a voltage difference greater than 300.0 µV within an interval, or a maximum voltage difference less than 0.50 µV within 100ms intervals. Applying transformations, including correcting to a baseline of 200 ms, (Gratton, Coles, and Donchin, 1983) and manually removing data from electrodes affected by gross movement or poor connection reduced number of artifacts. The data were averaged in 30-second epochs within each emotional clip. Only the last 30 seconds of the fear and sad emotion clips were analyzed under the assumption that they are the points at which the emotion has accumulated and is the strongest.
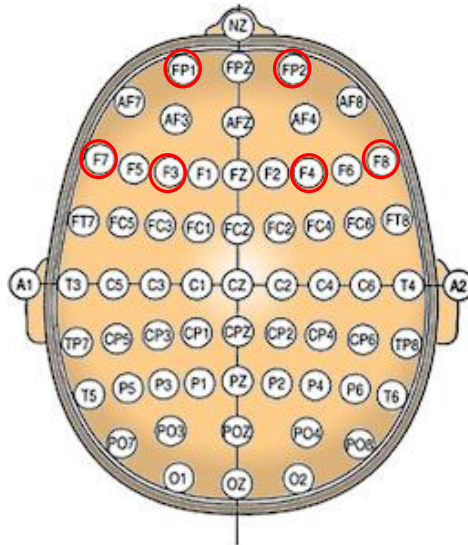
Figure 1. International 10-20 system. This map depicts electrode placement with nose and ears displayed for reference. The electrodes circled are those analyzed in this study. Electrodes on opposite hemispheres the same distance from the midline correspond to each other.

Electrodes studied include frontal F3/F4 and F7/F8 and prefrontal FP1/FP2 (see Figure 1). We recorded alpha band power at $7 - 12$ Hz through a Fast Fourier Transform; an algorithm that analyses the distribution of power within frequency bands. Asymmetry scores were calculated by subtracting left hemisphere electrodes (FP1, F3, F7) from their corresponding right hemisphere electrodes (FP2, F4, F8). The three asymmetry scores were used in analysis of the magnitude of asymmetrical activation. Asymmetry scores were also converted into categories of laterality. Because alpha power is inversely related to activation, positive asymmetry scores indicate left activation whereas negative asymmetry values indicate right activation. This laterality enables the study of qualitative rather than quantitative group differences.

Analytical Procedures

Chi-square tests were used to examine relationships between aggression grouping and categorical demographic variables, as well as lateralized EEG activation of frontal electrodes. A chi square test determined that the socioemotional intervention was not significantly associated with persistent or transient aggression group status ($X^2 = .00$, n.s.). Therefore, all subsequent analyses include all 150 participants with complete teacher-reported and physiological data.

Although 11 children were on medication at some point during kindergarten, a chi-square test verified no significant difference in group status due to medication ($X^2 = .00$, n.s.). These 11 children were kept in the study.

Sex was also tested with a chi-square and found to have a marginally significant effect on the differentiation of children with persistent and transient aggression ($X^2 = 3.84$, p = .06). This test showed that males were more likely to exhibit transient aggression and females were more likely to exhibit persistent aggression. This prompted our inclusion of sex as a covariate in further analyses.

Nine chi-square tests were used to examine the relationships between aggression group status and lateral activation of frontal electrodes F3/4, F 7/8, and prefrontal electrodes Fp1/2 during baseline, fear clip, and sad clip. The group status variable was compared to laterality in each electrode during each condition.

Step-wise regressions, models developed using ordinary least square regression with forced-entry in two blocks, were used to examine the predictive value of teacher-report constructs, cognitive ability variables, and EEG asymmetry. Step-wise regressions were chosen to compare the explained variance of multiple models with potential predictor variables. A step-wise regression was used to determine the predictive value of the first teacher-report and child sex on the degree of change in aggression over time. Block 1 included the first Aggressive/Oppositional Behavior score and sex because these variables showed potential in significantly predicting the change in aggression. Block 2 tested the additional predictive value of the other constructs from the teacher report: Prosocial Behavior, Emotion Regulation, and Internalizing/Withdrawn Behavior.

Step-wise regression analysis was also used to examine any effects of cognitive ability on degree of change in aggression. The first block of the regression included sex and first Aggressive/Oppositional Behavior score. The second block included Letter-Word Identification, Applied Problems, Block Design, and the EOWPVT.

To examine the predictive value of EEG asymmetry in addition to other teacher-report measures, 3 regression models attempted to predict the degree of change in teacher-reported Aggressive/Oppositional Behavior. Block 1 consistently included sex and the first Aggressive/Oppositional Behavior score. Block 2 introduced asymmetries from F3/4, F 7/8, and Fp1/2, for each condition. The model output describes the predictive value of emotion-related EEG asymmetry in addition to the teacher-rated behavioral report.

Results

Behavioral Assessments

The mean Aggressive/Oppositional Behavior raw scores of the sample were compared to constructs from which this report was composed; the Overt Aggression Construct and Oppositional Construct from the Teacher Observation of Child Adaptation-Revised (TOCA-R). The TOCA-R constructs were recorded for a normative sample (Rains, 2003). This sample scored about three times higher than the normative sample demonstrating that this sample is in fact, highly aggressive.

Shown in Table 2, the regression of teacher-report constructs on the degree of change in children's aggression scores yielded a significant result for the first Aggressive/Oppositional Behavior score, but for no other constructs. Neither sex nor any of the additional behavioral constructs (Prosocial Behavior, Emotion Regulation, and Internalizing Behavior) significantly

predicted the degree of change in aggression better than the first Aggressive/Oppositional Behavior score.

The negative β weight of the first Aggressive/Oppositional Behavior score indicates that higher scores in the first assessment were more likely to decrease by the second test, whereas lower scores were likely to increase. The test concludes that the combination of other behavioral constructs adds very little explanation of variance ($\Delta R^2 = .01$) to the first Aggressive/Oppositional Behavior score.

Table 2

Step-wise Regression Analysis of Teacher-Report Predicting Degree of Change in Aggression Over Kindergarten

	Model 1			Model 2		
Variable	*β*	*SE B*	*Sig.*	*β*	*SE B*	*Sig.*
Sex	-.05	.13	.54	-.04	.14	.61
1st Aggressive/Oppositional Behavior Score	-.37	.06	.00	-.40	.10	.00
Prosocial Behavior				-.17	.11	.20
Emotion Regulation				.10	.10	.40
Internalizing Behavior				-.05	.09	.65
R^2		.14			.15	

Note: $\Delta R^2 = .01$

Shown in

Table 3, the cognitive ability scores of this sample were not significant predictors of the degree of change in aggression when forced into a step-wise regression. The cognitive ability tasks add very little explanation of variance ($\Delta R^2 = .01$) to the first Aggressive/Oppositional Behavior Scale.

Table 3

Step-wise Regression Analysis of Cognitive Ability Predicting Degree of Change in Aggression Over Kindergarten

Variable	Model 1			Model 2		
	β	SE B	Sig.	β	SE B	Sig.
Sex	-.04	.14	.58	-.06	.15	.49
1st Aggressive/Oppositional Behavior Score	-.36	.06	.00	-.36	.06	.00
EOWPVT				.09	.01	.38
Letter-Word Identification Score				-.02	.01	.89
Applied Problems				-.08	.01	.49
Block Design				.05	.03	.58
R^2		.14			.15	

Note: $\Delta R^2 = .01$

EEG Analysis

Laterality. Chi-square tests found a significant relationship between aggression group status and prefrontal laterality at the Fp1/2 electrode site only during the sad clip, $X^2(1, 85) = 4.14$, $p < .05$). Children with transient aggression more frequently displayed left activation while children with persistent aggression more frequently displayed right activation. Figure 2 shows the trend in average alpha power for the Fp1 and Fp2 electrodes. The visibly greater change in electrode activation for children with transient aggression reflects the group's difference in frontal activation, yielding more frequent left activation.

The remaining eight chi-square tests comparing laterality in each electrode pair during each emotion yielded no significant results, all *p*s n.s.

Magnitude of Asymmetry. Three step-wise regressions, one for each emotion condition, modeled the predictive value of sex and first Aggressive/Oppositional Behavior score in addition to the magnitude of EEG asymmetry. These regressions yielded no significant relationships, all *p*s n.s.
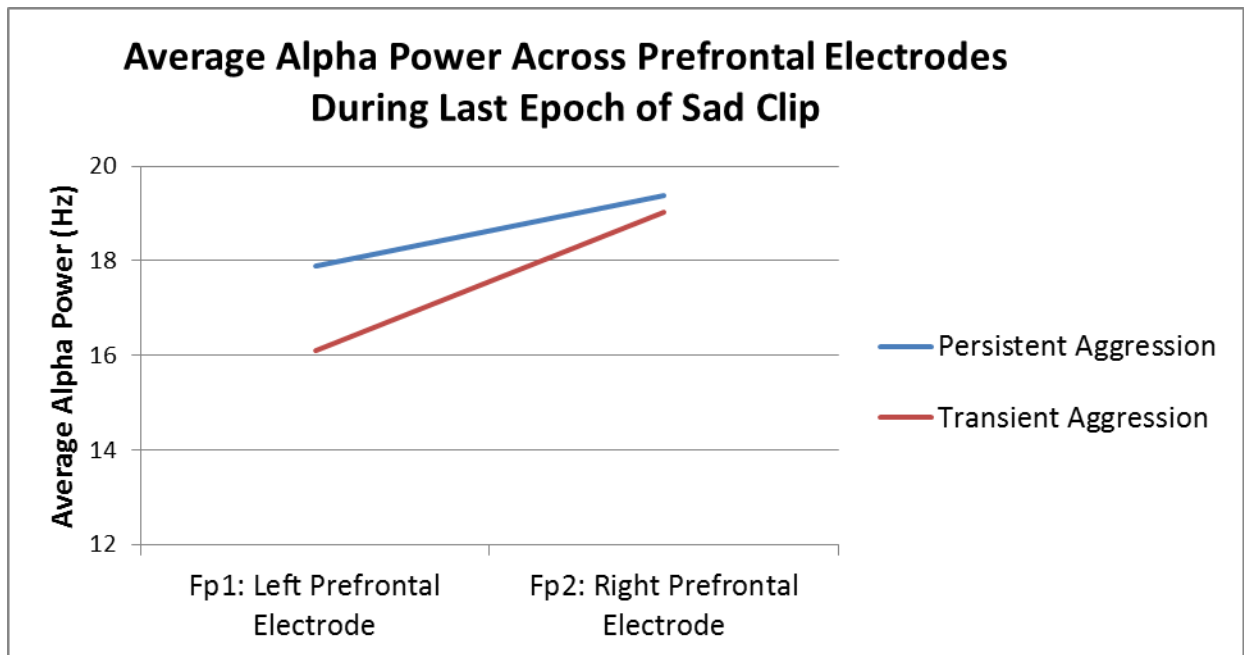
Figure 2. The graph depicts the trend in average alpha power across prefrontal electrodes during the last epoch of the sad clip.

Discussion

Predictive Value of EEG Asymmetry

We aimed to explore resting EEG differences in asymmetry between children with persistent and transient aggression. We also anticipated left laterality and greater left asymmetrical magnitude in children with persistent aggression during fear and sad emotion induction. This study found no difference in resting EEG asymmetries between children displaying persistent aggression and those displaying transient aggression. A significant difference was found in laterality between aggression groups during the last 30 seconds of the sad emotion inducing clip. No other laterality analysis or magnitude asymmetry analysis yielded significant results.

The laterality difference in children with persistent aggression and those with transient aggression emerged in a direction contrary to the original hypothesis. Children with transient aggression were more likely to display left activation during the most emotionally charged epoch of the sad clip, whereas children with persistent aggression were more likely to display right activation. Although this is an unexpected finding, this study demonstrated that prefrontal EEG asymmetry is related to transient versus persistent aggression group status over a kindergarten year. Although not statistically significant, as seen in Figure 2, there seems to be a magnitude difference in alpha power at the prefrontal electrodes during the last 30 seconds of the sad clip. This laterality finding and trend in magnitude lends some support for further investigation into staged screening procedures with biological measures.

More frequent left activation among children with transient aggression may be a reflection of the relationship between left activation and the ability to cope with emotional stimuli (Jackson et al., 2003). Because this study only analyzed the last 30 seconds of the sad emotion clip, we have no information on the brain activity during the progression of the clip. It

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is possible that children who naturally decreased in aggression over time were better able to employ coping skills over the course of the emotion clip and thus demonstrated more left activation by the end of the clip. Coping ability may have been enhanced by the likely familiarity with the Lion King movie, allowing children with higher coping skills to recall the positive ensuing outcome. Future research could employ novel emotion-inducing stimuli to reduce individual variability and directly assess children's coping skills to examine this hypothesis.

Predictive Value of Demographic and Behavioral Screening

This study also discovered other notable findings. There was a marginally significant relationship between sex and aggression group status. While the number of girls with aggressive behavior in the sample is consistent with the literature on childhood aggression (Connor, 2002), we found that girls were slightly more likely than boys to exhibit persistent aggression over kindergarten. Although this trend is only marginally significant, and sex was not found to be a significant covariate in our predictive models, sex differences in stability of aggression should be further examined.

With regard to the behavioral measures, only Aggressive/Oppositional Behavior, predicted change in aggression over kindergarten. While it may be expected that children with the highest levels of aggression in the first assessment are also those who maintain aggression over time, the step-wise regression between these variables shows that this is not the case. The direction of the relationship between first Aggressive/Oppositional Behavior scores and stability of aggression may be a function of regression to the mean, in which children scoring at the extremes of the scales, upon second assessment are more likely to score closer to the mean. This finding, in addition to the lack of predictive value in the other teacher-report constructs, is evidence that behavioral measures alone cannot accurately distinguish between children who are temporarily aggressive and those who will show chronic aggressive behavior

Limitations

Several methodological limitations hinder the conclusions that can be drawn from this study. It is possible that the lack of significant findings may be attributed to the nature of the emotions studied. In particular, fear may be too powerful of an emotion to detect subtle individual differences, inducing a ceiling effect of right frontal activation in almost all children and revealing no group differences in laterality and magnitude of asymmetry. A more moderate emotion, of the same intensity as the sad clip, may be more likely to uncover EEG asymmetry differences between the persistent and transient aggression groups.

Moreover, EEG measurement in children is frequently challenging given the sensitivity of EEG measures to gross motor movement, eye movement, and/or talking. Data loss due to movement artifact reduced the sample size for each EEG analysis and thus, may have compromised detectible differences. Movement related to the experience of intense emotions could have created a selective influence on data loss.

Finally, the reliance on teacher reports to determine aggression stability is less than ideal. Because the same teacher is asked to report on aggression at both time points, initial reports of aggression may have influenced teacher's perceptions and subsequent interactions with some children. Future research should consider assessing consistency of aggression across grades, or include observational behavioral assessments over a longer period of time in order to reduce the incidence of incorrectly identified children.

The Future of Staged Screening Procedures

Further research must be conducted to retest the predictive value of EEG frontal asymmetry and test other potential biological assessments in screening procedures. Conducting a longitudinal study from childhood into mid-adulthood, although challenging, would provide groupings of adult aggressors and those who desisted from aggression. Comparing childhood frontal activation differences between these groups sheds more light on the relationship between EEG asymmetries and persistent aggression.

In conclusion, the results of this study did not support our hypotheses, but EEG asymmetries during a sad emotion-induction condition did add predictive value to behavioral teacher reports in distinguishing between persistent and transient aggression over children's kindergarten year. Further research into the biological characteristics of aggression can greatly reduce the problem of stigma and self-fulfilling prophecy arising from screening for early interventions.

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Appendix A

Paths to Success: Screening Instrument

		Almost never	Rarely	Some-times	Often	Very often	Almost always
1	Friendly	1	2	3	4	5	6
2	Is liked by others	1	2	3	4	5	6
3	Cries a lot	1	2	3	4	5	6
4	Feels unloved	1	2	3	4	5	6
5	Feels persecuted	1	2	3	4	5	6
6	Worries	1	2	3	4	5	6
7	Feels worthless	1	2	3	4	5	6
8	Doesn't seem to feel guilty after misbehaving	1	2	3	4	5	6
9	Cruelty, bullying, or meanness to others	1	2	3	4	5	6
10	Gets in many fights	1	2	3	4	5	6
11	Temper tantrums or hot temper	1	2	3	4	5	6
12	Physically attacks people	1	2	3	4	5	6
13	Destroys property belonging to others	1	2	3	4	5	6
14	Doesn't get along with other pupils	1	2	3	4	5	6
15	Breaks rules	1	2	3	4	5	6
16	Harms others	1	2	3	4	5	6
17	Trouble accepting authority, disobedient	1	2	3	4	5	6

Appendix B

Child Behavior Questionnaire

	Almost Never	Rarely	Some-times	Often	Very Often	Almost Always
1. Invites others to play	O	O	O	O	O	O
2. Copes well with disappointment or frustration	O	O	O	O	O	O
3. Low energy, lethargic, or inactive	O	O	O	O	O	O
4. Shares with others	O	O	O	O	O	O
5. Breaks things on purpose	O	O	O	O	O	O
6. Accepts things not going his or her way	O	O	O	O	O	O
7. Keeps to him or herself, tends to withdraw	O	O	O	O	O	O
8. Is helpful to others	O	O	O	O	O	O
9. Feelings are easily hurt	O	O	O	O	O	O
10. Stubborn	O	O	O	O	O	O
11. Resolves problems with other children on his or her own	O	O	O	O	O	O
12. Listens to other people's point of view	O	O	O	O	O	O
13. Whines or complains	O	O	O	O	O	O
14. Controls temper when there is a disagreement	O	O	O	O	O	O
15. Acts younger than his or her age	O	O	O	O	O	O
16. Yells at others	O	O	O	O	O	O
17. Cooperates	O	O	O	O	O	O
18. Knowingly breaks rules	O	O	O	O	O	O
19. Understands other people's feelings	O	O	O	O	O	O
20. Sad, unhappy	O	O	O	O	O	O
21. Fights with other children	O	O	O	O	O	O
22. Expresses needs and feelings appropriately	O	O	O	O	O	O
23. Ignores or refuses to obey adults	O	O	O	O	O	O
24. Avoids playing with other children	O	O	O	O	O	O
25. Hits, pushes, or shoves	O	O	O	O	O	O
26. Stops and calms down when frustrated or upset	O	O	O	O	O	O

Lexical decay rate in adults with specific language impairment

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Introduction

Specific language impairment (SLI) is the presence of significant difficulties with language acquisition in the absence of any other impairment that traditionally poses a challenge to language acquisition. A person with a diagnosis of SLI has undergone a battery of tests that have ruled out hearing loss, general cognitive impairment, frank neurological dysfunction and the presence of any syndromes or additional disorders as threats to language acquisition yet demonstrates low scores on tests of language ability (Leonard, 1998). Although most of the research on SLI has focused on children, there is evidence that SLI persists into adulthood, and certain tests for SLI have proven reliable in adults (Johnson et al., 2010; Fidler, Plante & Vance, 2011).

One of the ways SLI manifests itself is in sentence processing ability. A general slowing of sentence processing and a failure to differentiate between grammatical sentences and certain kinds of agrammatical sentences in processing tasks have been observed in children and adolescents with SLI respectively (Montgomery, 2006; Leonard, Miller & Finneran, 2009). One explanation for this less efficient sentence processing is that individuals with SLI have weaker verbal working memories. Some studies attribute this weakness to generalized information processing limitations (Weismer, Evens & Hesketh, 1999; Miller, Kail, Leonard & Tomblin, 2001; Montgomery, 2000; Montgomery & Leonard, 1998), while other studies suggest problems in specific areas of information processing such as phonological processing or temporal processing of rapidly changing auditory stimuli (Corriveau, Pasquini & Goswami, 2007; Gathercole & Baddley, 1990; Gillam, Hoffman, Marler & Wynn-Dancy, 2002; Tallal, 1976). A study by Montgomery (2006) was designed to tease apart the implications of these two perspectives. He had children with SLI, age matched controls, and receptive language ability matched controls perform two word recognition reaction time tasks: one wherein the target word was part of a list of words and one wherein the target word was embedded in a sentence. When the target was part of a list, there was no significant difference in reaction time among the three groups, but when the target was embedded in a sentence, the SLI group demonstrated reaction

times that were significantly longer than both control groups. These results seem to indicate that the difference between people with SLI and people with typical language development has to do with higher-order linguistic processing operations rather than acoustic-phonetic processing.

Since linguistic processing relies on the activation of brain networks that support lexical knowledge, lexical decay may help facilitate the higher-order linguistic processing operations mentioned in Montgomery (2006). Lexical knowledge is stored in the nodes of the network, and the arcs of the network are pathways along which energy may travel to a node, raising the node's level of activation. Each node's level of activation corresponds to the availability of the information contained in that node to the working memory. If a listener experiences a lack of activation of the nodes that correspond to the words in the sentence they are hearing, they will not have enough information in their working memory to make sense of what they are hearing. If a listener experiences an abundance of activation of nodes that are irrelevant to the sentence they are hearing, then the irrelevant information will interfere with comprehension of the sentence at hand. Lexical decay mitigates this interference by making sure that the activation level of lexical nodes decreases over time. This means that nodes that have been activated most recently and are therefore more relevant to the current sentence are more active than nodes that were activated less recently. Lexical decay rate determines how quickly the activation decreases, maintaining the optimal balance between activation and interference in a given situation (Altmann & Gray, 2002). If an individual's lexical decay is not occurring at the most effective rate, they may experience inefficient sentence processing due to lack of activation of relevant nodes relative to the rest of the lexicon. We suspect that an inappropriate lexical decay rate could be one of the factors that account for the inefficient sentence processing of individuals with SLI.

Little research has focused on lexical decay in SLI. Two studies have found evidence for a difference in lexical decay rate for people with SLI although neither study was designed to look at lexical decay but to examine the timing of lexical access and word recognition processes respectively. Seiger-Gardner and Schwartz (2008) found a late semantic inhibition effect for children with SLI on a picture naming task that may be attributed to slower decay rates. Conversely, using a visual world paradigm, McMurray et al. (2010) found evidence that adolescents with SLI display lexical decay rates that are faster than normal. In a magnetoencephalography (MEG) study, Helenius, Parviainen, Paetau and Salmelin (2009) found an abnormally weak N400m response for a repeated stimulus in adults with SLI. The authors attributed it to impaired short-term maintenance of linguistic activation or unusually rapid release of irrelevant representations. Weismer and Hesketh (1996) observed that a fast speech rate put children with SLI at a disadvantage for lexical learning but that a slow speech rate did not necessarily aid their lexical learning.

The purpose of the current study is to use a sentence-embedded word recognition reaction time task to determine whether there is a difference in lexical decay rate between adults with SLI and adults with typical language development. Much of the work on real-time lexical processing in children with SLI has used this task, which has proven sensitive to the timing of lexical processing in children with SLI as well as in typically developing children (Montgomery, 2006). Participants hear a target word before hearing a sentence that contains that word. When they detect the target word in the sentence, participants press a button. The time elapsed from when the target word appears in the sentence to when the button is pressed can be used to estimate the

speed of lexical processing. The speed of processing is believed to correlate with the participant's level of activation for the target word. By manipulating the time elapsed between the initial activation of the target word and the instance of the target word in the sentence while controlling the amount of information involved in the task, we can estimate the decrease in activation of the target word over time, the decay rate for that item.

Methods

Participants

Nine adults (4 males and 5 females) with SLI ages 18.75 to 23.75 with a mean age of 21.24 and 15 adults (3 males and 12 females) with typical language development ages 18.58 to 25 with a mean age of 20.80 were recruited at post-secondary schools in central Pennsylvania. All participants spoke English natively, and each participant reported 14 years of education except one member of the typical group who reported 16. All participants passed a hearing screening at 25 dB HL. General cognitive impairment was ruled out by administration of the three subtests of the Wechsler Adult Intelligence Scale (Wechsler, 1997) to estimate performance intelligence quotient (PIQ).The participants were placed in either the SLI group or the typical group based on their composite performance on the Clinical Evaluation of Language Fundamentals, Fourth Edition Word Definition subtest, a 15-word spelling test (Semel, Wiig and Secord, 2003), and the Modified Token Test (Morice & McNicol, 1985) following the discriminant function suggested by Fidler et al. Vance (2011) which has shown a sensitivity of 78% and a specificity of 83% for discriminating adults with language impairments from adults with typical language development. A positive group membership value indicated membership in the SLI group and a negative group membership value indicated membership in the typical language development group (Table 1). Participants also completed a history questionnaire. Those with a history of language and academic difficulties but negative group membership values on the discrimination function were excluded from the study.

Table1: Group performance on IQ test and language measures

Group	Estimated PIQ[a]	Spelling test score[b]	CELF score[c]	Token test score[d]
Typical				
Mean	111.47	11.40	34.93	39.60
StDev	11.637	2.293	7.126	2.558
SLI				
Mean	101.11	5.33	32.44	31.67
StDev	10.154	3.041	5.503	3.841

Group membership=6.6626 + spelling score x -0.2288 + CELF score x -0.1475 + Token test score x -0.0893

[a]Mean standard score=100

[b]Total possible score=15

[c]Mean standard score=100

[d]Total possible score=44

Materials

The 80 sentences and target words used in this task were taken from Leonard et al. (2009). Although Leonard et al. used both grammatical and agrammatical sentences, the current study only used grammatical ones (Appendix A). The target appeared in one of three positions in the sentence (sixth, seventh or eighth word) to discourage participants from counting words yet provide some grammatical context. In the following examples, the target word is italicized.

(1)   (a) She looked at the man's *watch* because she forgot her own.
         (b) Brian likes it when he draws *cartoons* and funny faces.
         (c) Cary knows that he will recognize his *brother* in his Halloween costume.

The 80 sentences were distributed across four conditions. Three of the sentences were used as practice. Thirty-four were played at a normal speech rate. Thirty-four were slowed down with PRAAT software (Boersma & Weenink, 2006) by 50%. The goal of the slowed condition was to increase the duration of the sentences by about one second. The nine remaining sentences were catch items wherein the sentence did not contain the target word. The purpose of the catch condition was to maintain the vigilance of the participant. An example of a catch item appears in (2). The target is in parentheses.

(2)   Last week we biked ten miles with our friends. (*Swing*)

The number of items per condition was based on a power analysis that assumed a medium effect size. The target words were matched across normal and slow speech rate conditions on the log of the spoken frequency based on the Corpus of Contemporary American English (Davies, 2009).

The sentences and target words were recorded by a male native American English-speaker with vocal performance training in a sound booth using a head-mounted Shure WH20 microphone and a Marantz PMD650 minidisc recorder. After practicing each sentence to achieve natural intonation, the speaker made at least two recordings of each sentence and each target word in isolation. A research assistant then selected the version of each sentence and target word that sounded most natural. The selected recordings were then digitized at a sampling rate of 22 kHz, low-pass filtered, and amplitude normalized. Finally, the sentences were distributed randomly across the four conditions. There was no difference among conditions in the time elapsed from the beginning of the sound file to the sentence-embedded appearance of the target word before rate manipulation was applied.

Procedure

The task was presented by laptop computer using an E-Prime 2.0 script and a Psychological Software Tools serial response box. The response box was positioned beside the computer and aligned with the participant's preferred hand. The instructions were presented in written form on the screen but also given orally by the experimenter. Then, using headphones, participants performed a sentence-embedded word-recognition reaction time task wherein they heard a target word and were directed to press a button on the response box as soon as the target word appeared in the sentence that followed. The instructions emphasized responding as quickly and accurately as possible. The first three sentences were used as practice, and the remaining sentences were presented in two distinct counterbalanced pseudorandom orders. The constraints on randomization prevented more than five sentences from the same condition appearing in sequence, and ensured that at least one catch sentence appeared for each nine experimental sentences.

Results

Prior to analysis, negative reaction times (RT) and outliers were excluded. Outliers were computed on an individual basis and were defined as any RT that was more than twice the mean RT for that participant. Of the non-catch trials, 4.5% of the typical group's responses and 5.7% of the SLI group's responses were excluded as a result. Due to the right-skewed nature of the RT data, data were transformed using the inverse of the RTs prior to running parametric statistical tests. A summary of the results prior to transformation are shown in Table 2. A mixed between-within subjects ANOVA was run with the between subjects variable being group (typical or SLI) and the within subjects variable being speech rate. Reaction times were significantly longer for the slowed sentences than for the sentences played at the original rate (F (1, 22) =64.01, p<.001; η_p^2=.74). An interaction effect between group and condition shown in Figure 1 was significant (F (1, 22) =15.22, p<.01; η_p^2=.41). The reaction times of the SLI group were on average 92 ms longer than the reaction times of the typical group, but this difference was not statistically significant (F(1,22) =2.11, p<.2; η_p^2 =.09).

Table 2: Mean RT (standard deviation) for each condition by group

Group	Condition	
	Normal speech rate	Slowed speech rate
Typical	323(17)	417(94)
SLI	437(155)	487(180)

Figure 1: Mean RT by Speech Rate
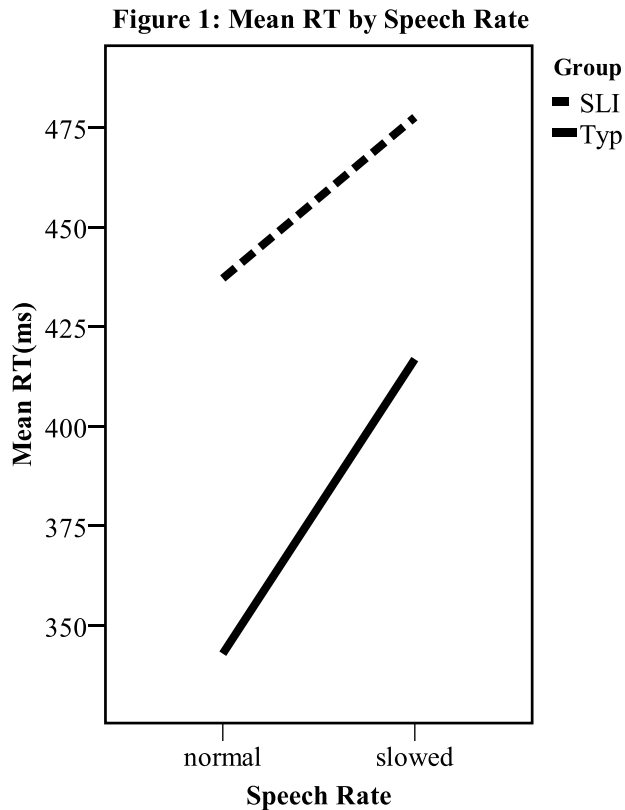
Discussion

The goal of this study was to determine whether there is a difference in lexical decay rate between adults with SLI and adults with typical language development using a sentence-embedded word recognition reaction time task. We found that although both groups had longer RTs in the slowed speech rate condition than in the normal speech rate condition, the RTs of the SLI group did not differ as much between the conditions as the RTs of the typical group did. This pattern suggests that the SLI group had a slower lexical decay rate than the typical group. This slower decay rate led to less disruption in the slowed speech rate condition, but could lead to greater interference and less efficient sentence processing overall for individuals with SLI. A limitation of our results is that we did not measure the participants' reaction times to a non-linguistic auditory stimulus. This information would have allowed us to isolate the time spent on linguistic processing from the total response time.

These results are inconsistent with McMurray et al. (2010) and Helenius et al. (2009) which suggest a faster than typical lexical decay rate for adolescents and adults with SLI respectively. However, they confirm Seiger-Gardner and Schwartz (2008), which found a slower than typical decay rate in children with SLI. The observation made by Weismer and Hesketh (1996) that a fast speech rate is detrimental to lexical learning in children with SLI is consistent with our results. However their observation that a slow speech rate is not helpful is inconsistent with our results.

These seemingly contradictory results can be resolved in terms of functional decay theory (Altmann & Gray, 2002). Functional decay theory proposes that decay and interference are functionally related and that decay rate adapts to the rate of memory updates. Altmann and Gray (2002) propose that decay rate is not stable; rather it is regulated by a mechanism for controlled decay. A mechanism for controlled decay that is less flexible in people with SLI can account for all the abovementioned literature on lexical decay rate in SLI. In the literature, the rate of memory updates can correspond to the word presentation rate used in experimental tasks. Studies that suggest a faster lexical decay rate in SLI such as McMurray et al. (2010) and Helenius et al. (2009) use word presentation rates of less than one word per second. Studies that suggest a slower lexical decay rate in SLI such as Seiger-Gardner and Schwartz (2008), Weismer and Hesketh (1996), and the present study use word presentation rates of two words per second or more. This combination of results suggests that people with SLI do not adjust their lexical decay rate to a given word presentation rate as well as typically developing controls, which may contribute to sentence processing issues for people with SLI overall. Ironically, the SLI group in the present study adjusted better than the typical group in that their RTs did not increase as much in the slowed condition. This may be attributable to the mixed presentation of the stimuli, which may not have allowed the typical group to adjust to either speech rate as well as they would have with a block design.

Future research can determine the degree of flexibility of the mechanism for controlled decay in people with and without SLI using a sentence-embedded word recognition reaction time task featuring a wider range of speech rates. The prediction would be that for a fast or normal speech rate, the SLI group would demonstrate a slower than typical decay rate, and for a very slow speech rate, the SLI group will demonstrate a faster than typical decay rate. A presentation

design variable of blocked versus mixed stimulus presentation can determine whether prolonged exposure to a particular speech rate helps listeners adjust their lexical decay to the optimal rate for the stimulus. If the controlled decay mechanism of typically developing individuals is better at adjusting to speech rates, then the block design would decrease the RT of the typical group more than the SLI group for each speech rate condition.

Appendix A

Practice sentences

The babysitter on weekends often bakes cookies for a treat.
When not studying, Sue listens to music in her room.
The thief in movies always admits guilt when questioned.

Normal rate sentences
A good dog should learn *tricks* when it is a puppy.
The librarian at the desk always reads *books* and magazines.
On Sundays, Marcy volunteers her *time* at the homeless shelter.
Jerry likes to carve the *turkey* with a sharp knife.
The young woman next door always wears *gloves* when raking.
The grocer at the market always buys *pears* and bananas.
The reporter at work always carries *pens* and a notebook.
We are hoping that Michael's *wish* comes true soon.
Today we are releasing the *bird* into the wild.
Henry would like it if Chris marries *Peter* in a traditional ceremony.
The carpenter on TV always bangs *nails* with a very big hammer.
Brian and Amy will pack a *suitcase* tonight.
She is always annoying the *driver* of our bus by shouting loudly.
The hostess's job is to take *guests* to their tables.
Many people will whisper in *church* because it is quiet.
The doctor will be caring for *grandma* when she goes home.
The band at the club usually begins *concerts* on time.
The hiker at Yosemite always cooks *dinner* over a campfire.
He will be repeating the *class* next year because he failed it.
The boy at parties always wins *prizes* in silly contests.
I will be buying my *father* a book for his birthday.
She is likely to arrive at *work* late because traffic is heavy
The young woman is choosing *flowers* to put in her scrapbook.
The daughter at college usually borrows *money* to buy school books.
Many parents like to name *babies* after someone in the family.
The salesman rang the woman's *doorbell* but no one was home.
I wish I had Sally's *tan* instead of my sunburn.
During the holidays, she always decorates *rooms* with holly and mistletoe.
My parrot at home always bites *bars* of his large cage.
Thomas and Sam are always kicking *rocks* and hurting their toes.

In the morning I dropped Sue's *daughter* at school.
The store in the mall always accepts *cash* or credit cards.

Slowed sentences

For her party, Chris is making *cards* on pink paper.
My sister in Texas usually calls *father* instead of emailing him.
The ghost jumps up and scares my *mother* at the haunted house.
The musician in town always beats *drums* to recorded music.
The police like to arrest *robbers* on TV.
Every year she travels and tours *museums* in big cities.
The coastguard is rescuing the *ship* that had radioed for help.
In archery you aim the *arrow* at the target.
You should watch closely as he paints *fruit* and flowers.
My mother always ignores our *jokes* that she considers in bad taste.
Some kids like to dare a *friend* to do something dangerous
Their mother likes to show *pictures* to the children at bedtime.
The man likes sailing and owns a *boat* at the yacht club.
I put a nail in my neighbor's *wall* to hang his painting.
She must be accepting the *job* offer at the big company.
If the man dies, the son inherits *land* and money.
The nurse in the hospital always gives *pills* to patients with water.
Mother says that my whistling bothers my *sister* when she is studying.
The lawyer read the parent's *will* to her family.
I am always running with *dogs* in the park.
The groom lifted the bride's *veil* during the wedding ceremony.
The child at the preschool always grabs *toys* from other children.
The famous star acts in and directs *movies* that make big money.
This rainy weather is ruining the *picnic* for the school.
The little girl found Martin's *ball* under the chair.
Brian likes it when he draws *cartoons* and funny faces.
You should never try to copy *answers* from a friend.
It is rude to swear at *dinner* but my brother does it.
The Boy Scout troop is selling a *bike* to raise money.
The girl at the mall always admires *women* wearing expensive clothes.
When company visits, Betty pours *tea* and Clara passes out cookies.
The gardener at the park never waters *flowers* after sunset.
My sister keeps borrowing my *phone* but never says thank you.
We plan to cheer our *team* loudly if they win the game.

Catch sentences

Father turned his boat around in the water. (*Moon*)
The people watched as the bull charged at the man. (*Whisker*)
Last night, she talked on the phone. (*Walnut*)

Last week I called my friend from home. (*Button*)
Last week we biked ten miles with our friends. (*Swing*)
Yesterday I buttered my toast at breakfast. (*Plane*)
When he cooked dinner he burned his finger on the pot. (*Lamp*)
Last week he passed his test with an A. (*Target*)
Yesterday, the storm damaged our roof. (*Net*)

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Behavioral Engagement: How Can You Measure It?

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Abstract

Employee engagement is a relatively new construct in academia and has received considerable press attention. Employee engagement is linked to positive business unit outcomes such as profitability, productivity, employee turnover rate, satisfaction, customer loyalty, and safety. The objectives of this study are to propose and validate the reliability of a behavioral employee engagement scale. The proposed scale ($\alpha = 0.908$) is negatively related to turnover intention and positively associated with employee safety grade, willingness to recommend organization as a place for work and care, and workplace safety. . Therefore, the proposed scale is posited to be valid and reliable.

Introduction

The employee engagement concept is relatively new in academia. The employee engagement construct first originated from survey houses and consulting firms (Macy & Schneider, 2008). Gallup Research Group, a consulting firm, created the employee engagement concept as a result of 25 years of interviewing and surveying employees and managers (Little & Little, 2006). The employee engagement concept has generated considerable press attention because Gallup researchers found a direct link between engaged employees and positive business outcomes. Practitioners and researchers have also found a positive relationship between employee engagement and organizational performance outcomes such as employee retention, productivity, profitability, customer loyalty, and safety (Attridge, 2009; Harter, Schmidt & Keyes, 2002; Markos & Sridevi, 2010; Robinson & Cooper, 2009; Robinson, Perryman & Hayday, 2004).

However, in most research references, employee engagement is related to human resource management and is often less accepted as an academic construct (Markos & Sridevi, 2010). The construct of employee engagement has only been tested empirically, and the theoretical frameworks have not been studied thoroughly. Various practitioners interpret the definition and the measure of employee engagement differently. Academic researchers have called for a clearer definition and measurement for employee engagement (Markos & Sridevi, 2010; Macy & Schneider, 2008; Little & Little, 2006; Robertson & Cooper, 2009). The purpose of this study is to clarify the concept of employee engagement and validate a proposed

behavioral employee engagement scale. The second purpose is to measure the ability of the proposed scale to predict common outcome variables.

What is Employee Engagement?

Researchers and practitioners agree that having engaged employees is beneficial to an organization. What they cannot agree on is how to name and define employee engagement. Numerous definitions and names exist.

Employee engagement is sometimes referred to as engagement (Crawford, LePine & Rich, 2010), personal engagement (Kahn, 1990), work engagement (Saks, 2006; Schaufeli & Bakker, 2003), job engagement (Kong, 2009), and organizational engagement (Saks, 2006). The name disagreement creates confusion in the field, leading to different interpretations. Practitioners and researchers need to agree on one name for this new construct in order to prevent further confusion.

Some researchers also believe that employee engagement is "old wine in a new bottle" (Macey & Schneider, 2008) because engagement is comprised of existing constructs, including organizational commitment, job involvement, job satisfaction, well-being, organizational citizenship behavior, and/or psychological empowerment (Little & Little, 2006; Harter et al., 2002; Saks, 2006). However, Macey and Schneider (2008) claim that employee engagement involves more than these existing constructs; it includes the personality, mood and actions of those in the workplace. Employee engagement thus functions as an umbrella construct, which is inclusive of various components of employee attitudinal and behavioral actions.

Definition is also a source of confusion. Kahn (1990, p.694) first defined personal engagement as the "harnessing of organization members' selves to their work role, in which people employ and express themselves physically, cognitively, and emotionally during role performances." Later, Schaufeli and colleagues (2002, p.74) defined work engagement as a "positive, fulfilling, work-related state of mind that is characterized by vigor, dedication, and absorption." In 2003, the Towers Perrin Talent Report defined engagement as employees' willingness and ability to contribute to company success. The following year, Robinson, Perryman, and Hayday (2004) described engagement as a two-way relationship between employer and employee, in which the employee holds a positive attitude toward the organization and its values. An engaged employee is aware of business context and works with colleagues to improve performance within the job for the benefit of the organization. The organization must also work to nurture, maintain, and grow engagement.

Finally, in 2008, Macey and Schneider provided a framework for employee engagement, breaking down the construct into state, trait, and behavioral engagement. The framework defined trait engagement as positive views of life and work; state engagement as feelings of energy and absorption; and behavioral engagement as extra-role behavior. Our employee engagement scale is based on Macey and Schneider's framework and seeks to measure behavioral engagement (see Figure 1). We chose Macey and Schneider's framework because their paper clearly identify and separates engagement into three distinct categories. The framework also explains the relationship between engagement and other existing constructs listed above. The thorough explanations demonstrate a comprehensive evaluation by the authors of other researchers' argument that employee engagement is an old construct with a new name. We chose to create a behavioral engagement scale instead of a trait and a state engagement scale because an employee's behavior can be influence. An employee's trait cannot be change and an employee's state can only be influenced temporarily. Being able to measure employees' behavioral engagement can help

managers identify what they need to implement in the workplace to better benefit the employees and the organization as a whole.

Existing Employee Engagement Scales

Two employee engagement scales are commonly cited, the Gallup Workplace Audit (GWA) and the Utrecht Work Engagement Scale (UWES). The GWA is fee-for-service survey owned by Gallup. The UWES is publicly available for non-commercial educational or research purposes. However, some of the data gathered must be shared with the authors.

The Gallup Research Group defines employee engagement as a combination of cognitive and emotional antecedent variables in the workplace (Harter et al., 2002). The elements included in GWA, collectively known as employee engagement, are actions within the organizations that support clear outcome expectancies, give basic material support, encourage individual contribution and fulfillment, provide a sense of belonging, and offer a chance to progress and learn continuously. Although many companies have used the GWA survey to measure their engagement levels, the methodology used to construct the GWA survey has been criticized. Little and Little (2006) referred to the questions asked in the GWA survey as "statistically derived items." In this case, statistically derived items mean that Gallup has only found statistically valid relationships among the questions. No theoretically framework explains why the questions were chosen. They also criticized Gallup researchers for spending too much time explaining the meta-analytic techniques used to find the relationships among the items in their questionnaire and the business unit level outcomes and not spending time to define and validate the construct of employee engagement. According to Harter et al. (2002), causal inference was the methodology used to derive the questionnaire; in addition, issues of statistical causality have not been addressed. Causal inference is not sufficient for the basis of scientific construct (Rothman & Greenland, 2005). As such, the accuracy of the GWA to measure employee engagement is questionable.

In contrast, the Utrecht Work Engagement Scale was created by Schaufeli and Bakker (2003). The UWES questionnaires are reformulated Maslach Burnout Inventory items. Schaufeli and Bakker (2003) believe that work engagement is the opposite of burnout. As mentioned, Schaufeli et al. (2002) break engagement into three subcategories: vigor, dedication, and absorption. In their words, vigor is characterized by high levels of energy and mental resilience while working, the willingness to invest effort in one's work, and persistence even in the face of difficulties. Dedication is defined as being strongly involved in one's work and experiencing a sense of significance, enthusiasm, inspiration, pride, and challenge. Absorption is characterized by being fully concentrated and happily engrossed in one's work.

The proposed behavioral engagement scale in this study is different than the GWA and UWES measurement. While GWA items align more with trait engagement (e.g. "At work, my opinions seem to count"), and UWES items align more with state engagement (e.g. "At my work, I feel bursting with energy"), our scale seeks to measure behavioral engagement. Behavioral engagement involves extra-role behavior, which translates into organizational citizenship behaviors, proactive and personal initiatives, role expansion, and adaptive behaviors (Macey and Schneider, 2008). Our scale explores behaviors that contribute to engagement and seeks to measure the effect of others on an individual. Employees generally have daily contact with their supervisor and coworkers. Workplace support is a predictor of a variety of work attitudes, especially job satisfaction, organizational commitment, and job involvement (Cropanzano, Howes, Grandey & Toth, 1997). Supervisors who value employee contributions have an effect

on how the employees view their organizational roles (Eisenberger, Stinglhamber, Vanderberghe, Sucharksi & Rohoades, 2002). Co-worker support affects the social environment at work and the employees' behaviors (Chiaburu & Harrison, 2008). Therefore, we believe that behavioral engagement can be divided into individual behaviors and behavior of others (see Figure 2). The behaviors of others, such as coworkers and supervisors, influence an employee's behavior at work.

Methods

Scale Development

The questionnaires in this scale are from the following US Department of Health and Human Services (HHS) surveys: Survey on Patient Safety Culture (SOPSC), National Nursing Assistant Survey (NNAS) and National Home Health Aide Survey (NHHAS). The SOPSC is conducted by the Agency of Healthcare Research and Quality. Many hospitals use this survey for accreditation. The NNAS and NHHAS are conducted by the Center for Disease Control and Prevention. The government uses the NNAS and the NHHAS to monitor the healthcare workforce in the United States. Content validity is established through years of replication. According to AHRQ, the Survey on Patient Safety Culture, on average, is re-administered every 16 months (Sorra & Nieva, 2004). According to HHS (2009), the NNAS was first conducted in 1973 and was repeated in 1977, 1985, 1995, 1997, 1999, and 2004. The NHHAS (HHS, 2010) was first conducted in 1992 and was repeated in 1993, 1994, 1996, 1998, 2000, and 2007. The NHHAS is a replication of the NNAS survey in an effort to create valid questions that monitor healthcare workers. The reliability estimates have been consistent for all three surveys.

Our scale consists of nine questions, four from the Survey on Patient Safety Culture and five from NNAS and NHHAS. The questions were measured on a 5-point Likert scale (1= strongly disagree, 5= strongly agree). The 9 items in this scale were chosen because the questions measure the behaviors of one's colleagues, how employees function as a unit, and how the organization and the supervisor treat employees. This aligns with our proposed behavioral engagement model. Outcome variables are also included in this study to examine if our proposed scale demonstrates valid relationships with commonly examined variables in healthcare management research. Outcome variables include overall safety grade of the hospital unit, workplace safety scale, willingness to recommend hospital as a place for work and as a place for care, and turnover intention.

Factor analysis and Cronbach's alpha were used to ensure construct validity and internal consistency reliability. Multiple linear regressions were used to examine the relationship between the proposed behavioral employee engagement scale and the outcome variables with gender, race, and education as covariates. Based on the engagement literature, we expect gender, race, and education to have an effect on the relationship between our proposed scale and outcome variables. Multiple linear regressions were also used to examine the relationship between job satisfaction and outcome variables. According to Macey and Schneider's (2008) framework, the meaning of the construct engagement is highly linked to the meaning of job satisfaction. This means that engagement should have the same relationships with the outcome variables as job satisfaction would have. Running duplicate regression models using both engagement and job satisfaction as independent variables will enable us to compare the statistical findings of our proposed behavioral engagement scale to the statistical finding of job satisfaction. Similar findings will support the validity of the scale and help to determine how other people's behavior in the workplace influence individual employee engagement.

Participants and Procedures

Using the proposed questionnaires, we tested hospital support service workers across five states: Illinois, Texas, Maryland, Kentucky, and Pennsylvania. Data was collected from 11 hospitals within 4 healthcare systems. A total of 1,922 surveys were administered, and 1,307 people responded for a return rate of 68%. Support service workers, most of whom are environmental services and food and nutrition workers, were surveyed. Most workers (41.6%, n=544) have worked in the hospital for one to five years. Of the surveyed workers, 40.8% (n=556) were Black or African American and 23.3% (n=218) were White. A majority of the participants (50.7%, n=623) had a high school diploma or equivalent (see Figure 3 for demographics).

Results

The reliability of the proposed scale has a Cronbach's Alpha of 0.908. According to George and Mallery (2009, p. 231), a Cronbach's alpha greater than 0.9 is considered excellent. Using confirmatory factor analysis, we extracted the items into both one and two factors. We then compared the one factor extraction to a two factor extraction but the percentage of variance did not increase significantly and weaken the item loadings. The one factor model is acceptable as the variables load together as one construct. The Eigenvalue is 58.64 %, which means that the items explain 58.64 percent of the variance in reported engagement.

An analysis of multiple linear regression shows that the proposed scale is a significant predictor of business level outcomes. Our proposed scale is positively related to the overall safety grade that employees give to their work unit in the hospital (β=.523, p-value <.001), workplace safety (β=.707, p-value <.001), the willingness to recommend their agency as a place to work (β=.547, p-value <.001), and the willingness to recommend their agency as a place to seek care (β=.374, p-value <.001). A positive relationship means that as the independent variable increases, the dependent variable also increases. For example, as behavioral engagement level increases, employees are more willingly to recommend their agency as a place for work. Our proposed scale is negatively related to turnover intention (β=-.227, p-value <.001), which means that less engaged employees are more likely to leave the organization within the next year.

Job satisfaction has a positive association with overall safety grade (β= .342, p-value <.001), workplace safety (β= .431, p-value <.001), willingness to recommend the agency as a place to seek work (β= .458, p-value <.001) and care (β= .289, p-value <.001). There is a negative association between job satisfaction and turnover intention (β= -.352, p-value <.001).

Gender was not found to be significant in any of the regression analysis. Ethnicity was found to be positively related to overall safety grade (β=.067, p-value<.05). Education was found to be negatively associated with overall safety grade (β=-.102, p-value <.001) and positively related to workplace safety (β=.045, p-value <.05). These results tell us that in some relationships, ethnicity and education have an effect on the outcome variables.

Discussion

Using the Macey and Schneider employee engagement framework, a behavioral engagement scale was developed. This study shows that the proposed behavioral engagement scale has high internal consistency reliability, which indicates that the results are repeatable and consistent. Factor analysis also revealed that engagement is a one-dimensional construct - a finding that aligns with other employee engagement scales that are also one-dimensional

(Seppala et al., 2008). This means that engagement is a one factor construct. Using regression analysis, the proposed scale has shown to be a significant predictor of organizational outcomes. We conducted two regression models in this study in order to examine the relationship of our proposed scale in comparison to job satisfaction. The relationships revealed that our behavioral engagement scale was able to mirror the same results as job satisfaction. The results confirm existing relationships between engagement and outcome variables such as job turnover (Eisenberger et al., 2002), and safety (Tucker, Chmiel, Turner, Hershcovis, & Stride, 2008).When controlling for covariate influences, we expect gender to have a positive relationship (Clark, 1997), education to have a negative relationship (McNeese-Smith, 1997), and ethnicity to have no relationship (Mynatt, Omundson, Schroeder & Stevens, 1997) in the model. Contrary to our expectations, gender was not found to be significant, education was negatively related with overall safety grade and positively related to workplace safety, and ethnicity was only found to be positively associated with overall safety grade.   However, the combined results of reliability, factor, and regression analyses indicated that the proposed behavioral engagement scale is valid and reliable.

   Supervisors and coworkers have a direct influence on employees' behaviors. According to Chiaburu and Harrison (2008, p. 1094), "coworker actions predict perceptual, attitudinal, and behavior outcomes of their colleagues." This means that a strong link exists between a coworker's action and an employee's perception of the work environment, directly influencing the employee's job satisfaction, job involvement, and organizational commitment. In terms of leadership and supervisor support, Eisenberger and colleagues (2002) found that employees who believe that supervisors who value employee contributions and care about employees' well-being have an inverse relationship with turnover; greater supervisor support results in fewer turnovers. In another study by Griffin, Patterson, and West (2001), supervisor support showed a strong relationship with job satisfaction. These studies all indicate that behavioral engagement is fostered by actions of others within the workplace. Behavioral engagement is affected by how one's colleagues behave, how employees and colleagues function as a team, and how the organization and the supervisors treat workers. To be able to measure and interpret the behavioral engagement level in the workplace is beneficial to an organization.

Limitations and Future Directions

   There are several limitations in this study. First, factor analysis and multiple regression modeling were our validation methods. Higher statistical validations are needed to confirm the accuracy of the scale. Confirmatory factor analysis, structure equation modeling, and fit indices are recommended. Generalizability of this study is also limited to hospital support service workers in similar hospitals as we studied. Although we expect the behavioral engagement scale to measure engagement despite occupation and profession type, future studies should test the scale using other occupation type. This will ensure that the proposed scale remains consistent across various occupations. Third, the study is conducted in a cross-sectional manner. Future studies should use a longitudinal study design to repeatedly measure engagement level. Replication should be made with support service workers in other health care systems to determine if behavioral scale remains valid. Participant bias might also be a source of limitation. Support service workers might feel obligated to answer in a positive manner in order to keep their job. A majority of the participants have an education level of high school or less and skills required to be a support service worker are seen as less transferable, therefore response bias is probable. Finally, a final limitation to this study is that the questions in our scale were not

developed with engagement as the key outcome. Future studies should utilize our scale simultaneously with other employee engagement measures to determine if our scale measures a distinctly different component of employee engagement from the existing scales.

Conclusion

Engaged employees are beneficial to an organization. Engaged employees dedicate themselves to accomplish tasks. Since a person's disposition cannot be changed and a person's state can only be influenced temporarily, having employees who are engaged behaviorally is more meaningful. Employee behaviors are influenced by the organizations, colleagues, and supervisors. Supervisors and managers have daily contact with their employees. This unique position allows managers and leaders to influence the employees and their engagement level. Facilitating actions in the work environment that encourage support, teamwork, a sense of belonging, clear expectations, and a chance to progress and learn is in the best interest of the organization. A better work environment leads to increased behavioral engagement and better organizational outcomes. For healthcare managers, it means that they have the power to create a workplace that engages workers. This is especially valued in the healthcare industry as highly engaged workers are likely to provide better services and better care, subsequently influences patient experiences in a positive manner. With patient safety and quality of care continuing at the forefront of critical goals in healthcare, employee engagement offers a way for organizations to better attain their patient care goals

Using relevant behavior items, we offer a strong foundation for the continued use of our behavioral engagement scale in employee engagement studies. With coworkers and supervisors contributing to the everyday work environment, the need to examine how the actions of others becomes paramount. We believe more studies are needed to focus on measuring actions at work that can positively change the overall workplace environment.

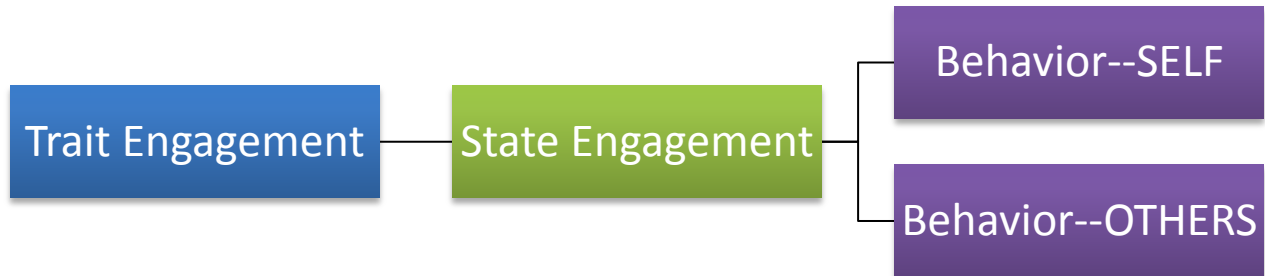**Tables and Results Available from Authors on Request**

Figure 1: Employee Engagement Model[1]

[1]Macey, W.H. and Schneider, B. 2008.The meaning of employee engagement. *Industrial and Organizational Psychology*, 1: 3-30.

Figure 2: Behavioral Engagement Framework[2]

[2]Adapted from Macey, W.H. and Schneider, B. 2008.The meaning of employee engagement. *Industrial and Organizational Psychology*, 1: 3-30.
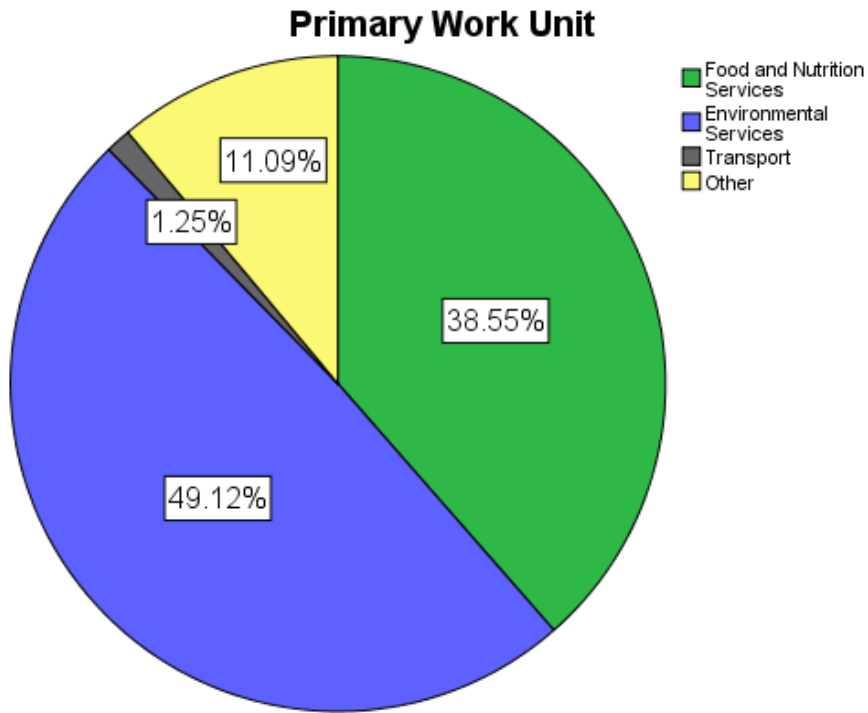
Figure 3a: The primary unit in which participants work

Primary Work Unit

Legend:
- Food and Nutrition Services
- Environmental Services
- Transport
- Other

38.55%
49.12%
1.25%
11.09%

Figure 3b: The length participants have been working in the specify hospital

Length Working in Specify Hospital

Legend:
- Less than 1 year
- 1-5 years
- 6-10 years
- 11-20 years
- More than 20 years
- other

14.54%
37.67%
15.64%
14.39%
8.22%
9.54%
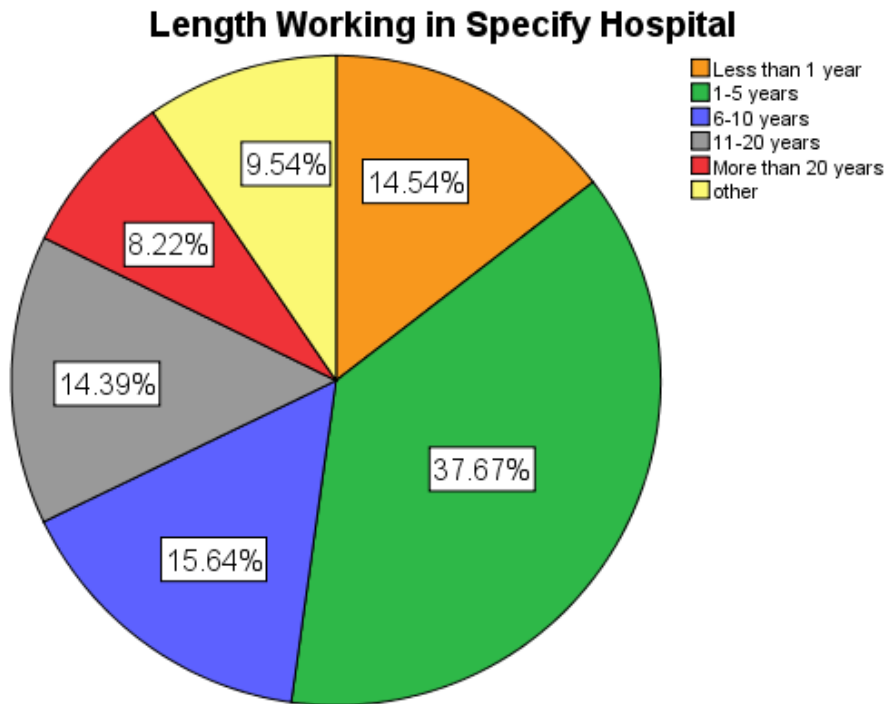
Figure 3c: The ethnicity breakdown of participants

Ethnicity

Legend:
- White
- Black or African American
- Hispanic or Latino
- Other

23.35% — White
40.82% — Black or African American
17.40% — Hispanic or Latino
18.43% — Other
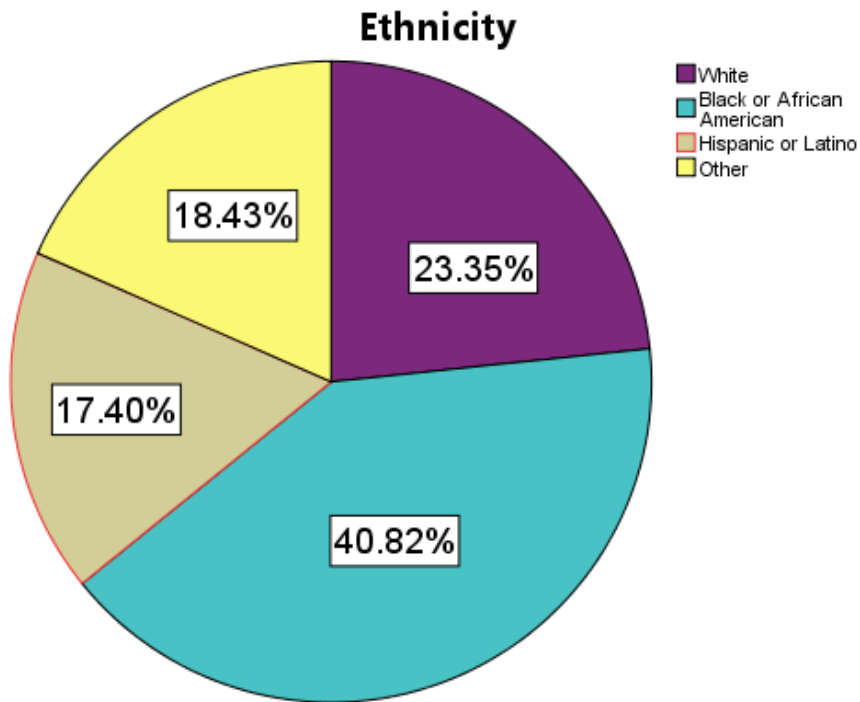
Figure 3d: The education levels of participants

Education Levels

Legend:
- Less than high school
- High school diploma (or equivalent)
- Some college or technical education
- College, technical, and/or post secondary degree
- Other

12.56% — Less than high school
45.74% — High school diploma (or equivalent)
21.95% — Some college or technical education
10.06% — College, technical, and/or post secondary degree
9.69% — Other
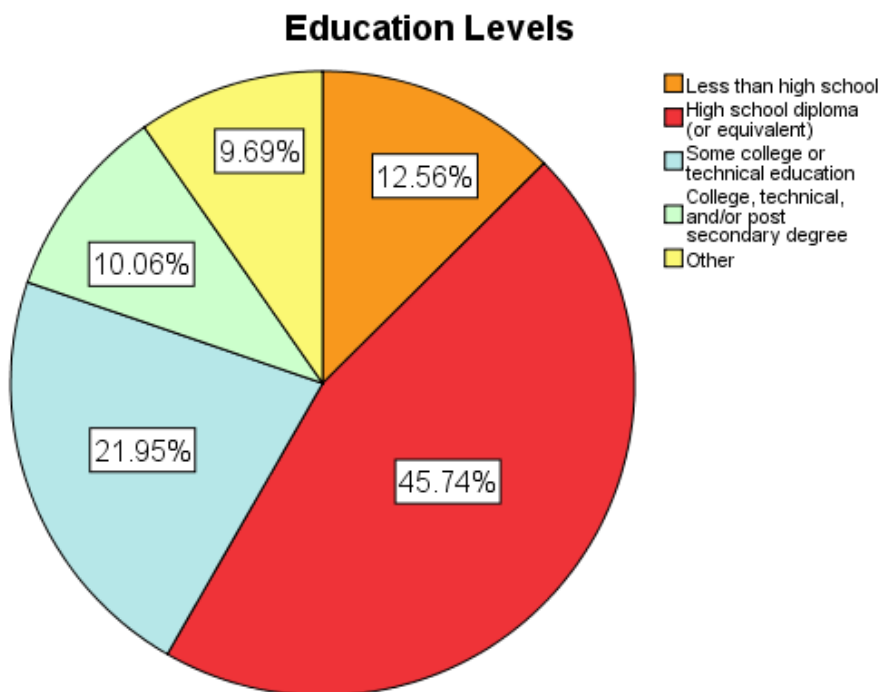
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BUBBLE PUMP MODELING FOR SOLAR HOT WATER HEATER SYSTEM DESIGN OPTIMIZATION

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ABSTRACT

Solar thermal water heating systems reduce household energy bills by using the free solar radiation provided by the sun to heat water for residential needs. In order to eliminate the need for electricity to run a pump to drive the fluid circulation in these systems, fluid buoyancy effects can be employed to move the fluid from lower elevations to higher elevations. There are several operational challenges with conventional "thermosyphon" systems, such as reversing flow and overheating, which can all be addressed by using a bubble pump mechanism. Although the solar thermal bubble pump water heating system has been on market, little research has been done on the optimization of the system to improve its efficiency. Engineering Equation Solver software is used to implement a mathematical model for the bubble pump system operation. The model allows for parametric studies of the design attributes to investigate optimum efficiency conditions for the thermally driven pump.

NOMENCLATURE

Symbols

A Cross-sectional area (m^2)

A_1 Constant

Bo	Bond Number
B_1	Constant
C	Constant (with subscripts 1-8)
C_o	Distribution parameter
C_n	Constants in Chexal-Lellouche Void Model (n = 1,2, …8)
COP	Coefficient of Performance
D	Diameter of lift tube (m)
D_o	Diameter of entrance tube (m)
D_2	Reference diameter (m)
f	Friction factor
f'	Fanning friction factor
g	Acceleration of gravity (m/s^2)
H	Height of Generator liquid level (m)
j	Superficial velocity (m/s)
K	Experimental friction relationship
K_o	Correlating fitting parameter
L	Length of lift tube (m)
L_o	Length of entrance tube (m)
L_C	Chexal-Lellouche fluid parameter
m	Constant (different drift flux analysis than in slug/churn transition analysis)
$\dot{m}$	Mass flow rate (kg/s)
n	Constant
N_f	Viscous effects parameter

P	Pressure (bars)
Q	Volumetric flow rate (m³/s)
$\dot{Q}$	Heat transfer rate (W)
r	Correlating fitting parameter
Re	Reynolds number
S	Slip between phases of two-phase flow
T	Temperature (K)
V	Velocity (m/s)
x	Quality
Y	Mole fractions

Greek characters

ε	Void fraction
ε_R	Pipe roughness (m)
ρ	Density (kg/m³)
μ	Fluid viscosity (kg/m-s)
σ	Surface tension (N/m)
Σ	Surface tension number
$\dot{\forall}$	Volumetric Flow Rate (m³/s)

Subscripts

0	State 0 (in governing equations)
1	State 1 (in governing equations)
2	State 2 (in governing equations)
a	Ammonia

BP   Bubble pump

G   Gas

gj   Drift

h   Homogeneous conditions (in two-phase flow)

L   Liquid

m   Mixture

TP   Two-phase

v   Vertical

w   Water

Superscripts

*   non-dimensionalized

NTRODUCTION

Renewable energy technologies, such as wind and solar power, are being widely studied by researchers today as many countries are trying to reduce their dependence on non-renewable energy sources (i.e. fossil fuels). Massive use of conventional, non-renewable resources produces greenhouse gases which contribute significantly to climate change. Renewable energy sources, such as solar and wind energy, on the other hand, do not produce greenhouse gases. They are sustainable and free of cost.

According to the World Watch Institute (WWI, 2011), "The United States, with less than 5 % of the global population, uses about a quarter of the world's fossil fuel resources—burning up nearly 25 % of the coal, 26 % of the oil, and 27 % of the world's natural gas." In 2009, buildings consumed 72% of electricity and 55% natural gas of total consumption in the US. Water heating for buildings accounted for about 4% of the total energy used in 2009.
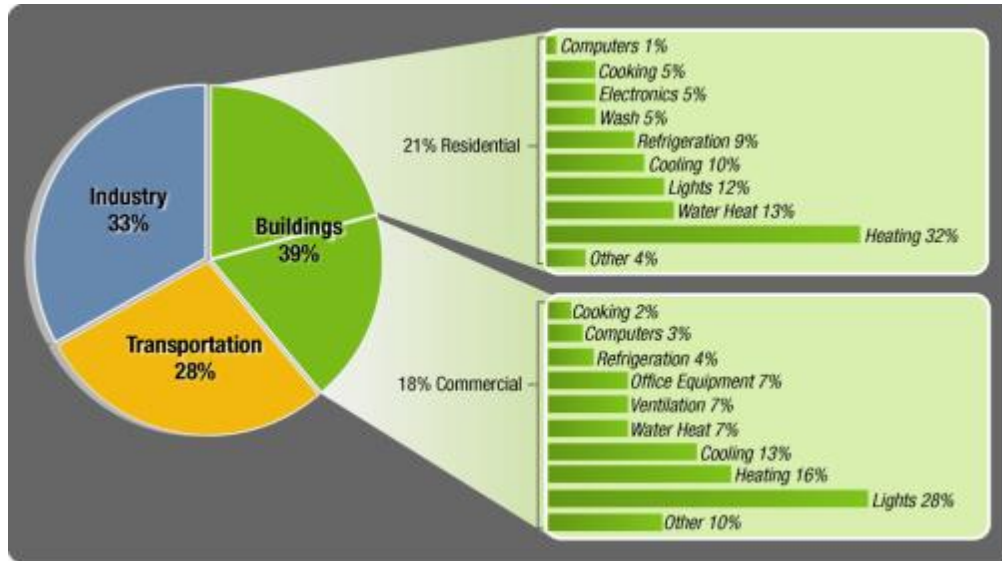
Figure 1: US Energy Consumption by Sectors

Solar thermal water heating (STWH) systems are both cost efficient and energy efficient. The STWH systems are most suitable for places with hot climates and direct sunlight, but can also work quite well in colder climates found throughout the United States. Different designs of the STWH systems have overcome the challenges such as freezing, and overheating. Most STWH systems have a flat plate solar collector tilted towards the south on the roof of the residence as shown in Figure 2. Flat plate solar panels consist of four parts: A transparent cover which allows minimal convection and radiation heat loss, dark color flat plate absorber for maximum heat absorption, pipes which carries heat transfer fluid that remove heat from the absorber, and a heat insulated back to prevent conduction heat loss. Within this collector, there is a network of black tube inside which flows water or some other fluid. The fluid in the tube enters the panel relatively cold and is heated as it flows through the panel as the black exterior of the tubes absorbs the heat from the sun. The heat transfer fluid and the materials selected for the tubes are important parameters for the system to withstand drastic temperature differences of freezing and overheating. If the fluid is water, then it goes right into a hot water storage tank. If another working fluid is used, the heat is then transferred from the working fluid to the water in the hot water tank via a heat exchanger in the tank.
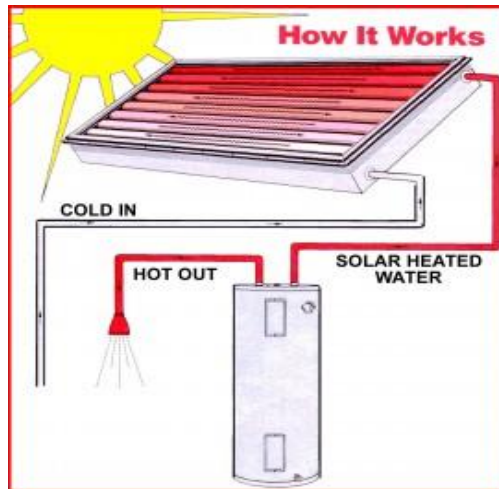
Figure 2: Simple Schematic of a STWH[1]

Two of the most common STWH system types are passive and active systems. The fluid in a passive system is driven by natural convection, whereas in active systems, the fluid is moved via a pump. Active systems would be more reliable; however, they require another form of energy input other than solar energy to run the pumps inside the systems. Thus, passive systems are preferred for economic purposes, but they have their own set of technical challenges.

One of the most favorable passive systems is a thermosyphon STWH system, shown in Figure 3. A thermosyphon is an open loop system that can only be used for nonfreezing climates. The simple design of the thermosyphon system is economically efficient. Theoretically, in a thermosyphon system, the tank has to be above the solar panel. Using gravity, the cold water from the tank flows downward and enters the tube beneath the panel, and gets heated up inside the tube. During this process, similar to a hot air balloon, the less dense hot water is buoyant and thus floats to the top of the tube and slowly reaches the top of the tank. Then, more cold water would drain down from the tank and get heated up. The process continues on until the water of the tank reaches thermal equilibrium. Although the system seems ideal, there are problems such as overheating and freezing. Furthermore, the temperature differences of the tank from sunrise to sunset will always be positive; therefore, the pressure difference will also be positive. If the pressure of the system is not designed properly, there will be a reverse-thermosyphon effect, which happens often during drastic temperature drops. The reverse-thermosyphon effect can cause flooding.
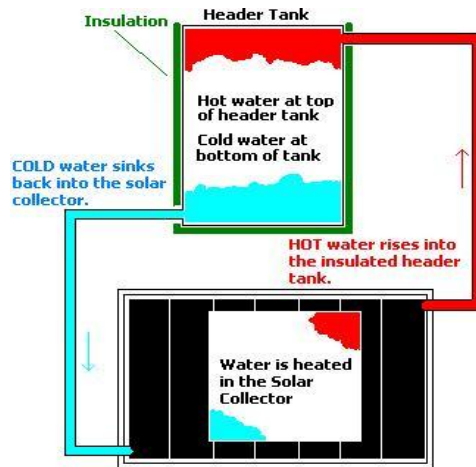
Figure 3 : Thermosyphon Solar Hot Water Heating System[2]

A bubble pump, also known as a geyser pump, STWH system, as shown in Figure 4, is an improved version of a closed loop thermosyphon system. It is not an active system, but works as one. The unique design of the system runs like a pump but does not require mechanical work as input to run the pump. When heat is added to the system liquid water changes into two phases, liquid and vapor; which creates a two-phase flow. The buoyance of gas creates a pump-like effect that pushes boiling water to a higher elevation. Unlike the thermosyphon system, the position of the tank does not depend on the solar panel. With an initial hand pump to get the pressure in the bubble tank to be in vacuum, cold water enters to the bottom of the panel. Similar to thermosyphon system, the water heats up through natural convection and hot water rises to the top of the panel due to buoyancy. Hot water leaves the panel through lifting tubes and enters a second reservoir, which then drains down to the top of the tank and creates a pressure difference in the system. Due to the pressure difference, the cold water in the tank will rise up into the panel. When the water in the panel is overheated, the pressure in the system is unstable, then the valve of the header at second reservoir opens, this then is connected to a third reservoir and allows vapor gas to escape the closed system. The third reservoir is connected to the entrance of cold water in the panel. Once the vapor gas condenses, it flows together into the panel again with the cold water. By doing so, it also preheated the cold water entering the panel. The bubble pump system also adds in an antifreeze working fluid to prevent freezing. The most commonly used antifreeze fluid is a mixture of propylene glycol and water. Although the bubble pump is slightly more costly than a thermosyphon system, it does prevent freezing, overheating, as well as reverse-thermosyphon effects.

There are several parameters of the bubble pump which can be adjusted to optimize the STWH system. These parameters include: the diameter of the lift tube, the number of lift tubes, and the material of the lift tube. Slug flow is the optimal operating two phase flow regime for fluid pumping (White, 2001), but because this system will change dynamically with solar input fluctuations, it will be difficult to design the bubble pump to stay in this regime. For a given system operating temperature, previous studies have shown that a smaller than optimal diameter lift tube will experience churn flow and a much higher than optimal diameter tube will produce bubbly flow (White, 2001). As the temperature of the solar flat plate collector changes throughout the day, the two phase flow regime in the lift tube changes between bubbly flow, slug

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flow, and churn flow. Because the optimum diameter is limited in size for maximum efficiency, multiple lift tubes may be needed to achieve the desired flow rate of hot water through the system. Multiple lift tubes can help boost up the speed of removing heated water from the flat panel, which then increase the circulation speed of the system and can help the system stay in the slug two-phase flow regime for a longer period of time. Material properties also influence the surface tension related forces in the two phase flow structure which thus influences the performance of the system.

There are very few studies in the literature regarding the operation of a bubble pump driven solar thermal system, however two companies are offering such systems in the U.S. market: Sunnovations and SOL Perpetua. There are geyser pump SHWS patents by Haines(1984) and van Houten(2010) related to these two companies. Both involve copper lifting tubes. Haines (1984) uses a mixture of water and methanol as working fluid of the system, van Houten (2010) uses water, whereas SOL Perpetua (2011) uses water propylene as the working fluid. Li et al (2008) believed the diameter and friction factor of the lifting tube have an inverse relationship to each other, and as diameter of the lifting tube increases, the efficiency of the bubble pump would also increase.
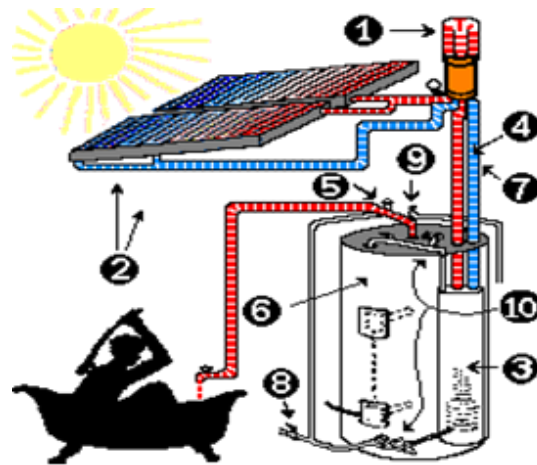

Figure 4: Bubble Pump Flow Schematic[3]

Two-phase flow is the main mechanism for running the bubble pump in a STWH system. As the water boils, the water vapor coalesces and pushes slug of liquid water through the pipe into another water storage reservoir. Although the bubble pump has been used greatly in other products, such as the percolating coffeemaker, rarely any research was done on the optimization of the system (White, 2001). Some key terminology associated with two-phase flow is listed in Table 1. There are four types of basic flow patterns: bubbly, slug, churn, and annular, shown in Figure 5.

Table 1: Two-Phase Flow Parameters

| Parameter	Units (SI)	Definition
ρ_G	kg/m^3	Density of gas phase
ρ_L	kg/m^3	Density of liquid phase
D	m	Diameter of lift tube
$A = \pi D^2/4$	m^2	Total cross sectional area of pipe
A_G	m^2	Cross sectional area gas occupies
$A_L = A - A_G$	m^2	Cross sectional area liquid occupies
$\varepsilon = A_G/A$	-	Gas void fraction of the flow
$\dot{\forall}_G$	m^3/s	Gas volumetric flow rate
$\dot{\forall}_L$	m^3/s	Liquid volumetric flow rate
$\dot{\forall} = \dot{\forall}_L + \dot{\forall}_G$	m^3/s	Total volumetric flow rate
$j_G = \dot{\forall}_G/A$	m/s	Gas superficial velocity
$j_L = \dot{\forall}_L/A$	m/s	Liquid superficial velocity
$j = j_L + j_G$	m/s	Total average velocity of flow
$V_G = j_G/\varepsilon$	m/s	Velocity of the gas
$V_L = j_L/(1-\varepsilon)$	m/s	Velocity of the liquid
$\dot{m}_G$	kg/s	Mass flow rate of gas
$\dot{m}$	kg/s	Total mass flow rate
$x = \dot{m}_G/\dot{m}$	-	Quality
$S = V_G/V_L$	-	Slip between phases
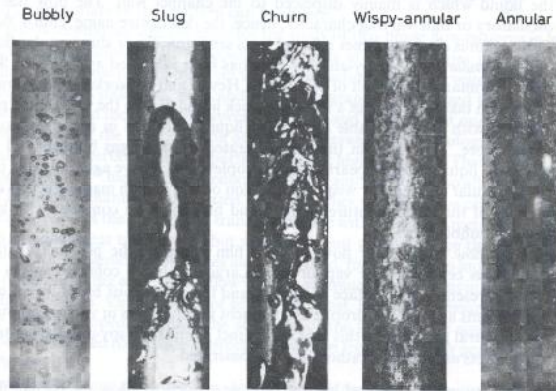
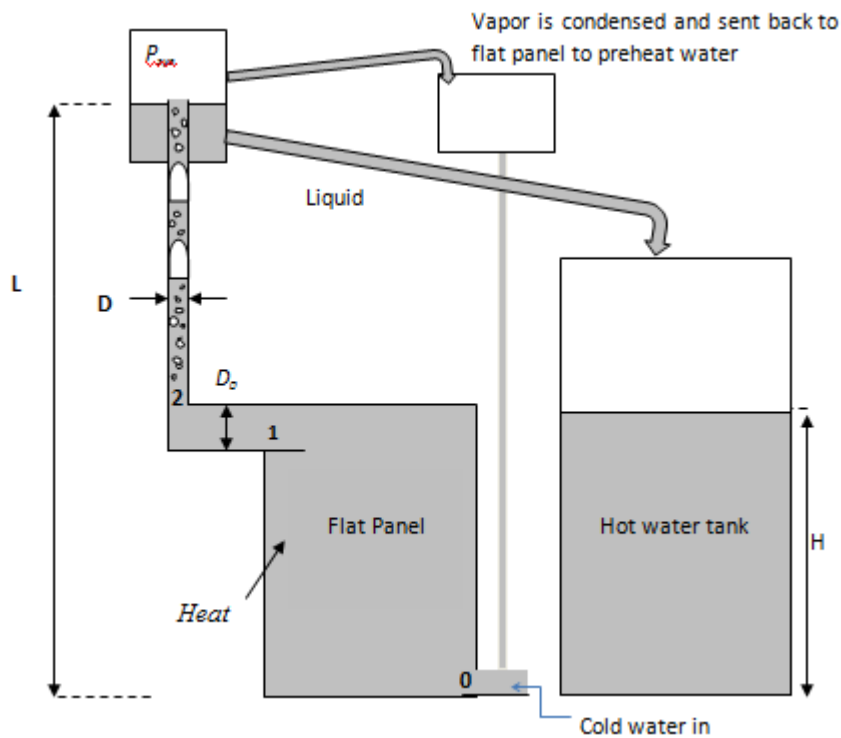Figure 5: Vertical Two-Phase Flow Regimes (Collier & Thome 1996)

Figure 6: Bubble Pump System Layout

A series of momentum and mass flow balances can be performed to model the operation of the bubble pump system based on the definitions of the state locations in Figure 6. These equations are provided in detail as follows:

Momentum equation from P_{sys} to 0 gives:

$$P_0 = P_{sys} + \rho_L g H - \rho_L \frac{V_0^2}{2} \qquad [1]$$

Where:

V_0 is the velocity (m/s) at point 0 (liquid solution)

Momentum equation from 0 to 1 yields (including pressure drop from friction):

$$P_1 = P_0 - \rho_L V_0 (V_1 - V_0) - \rho_{TP} g H_{FP} \qquad [2]$$

Where:

V_1 is the velocity (m/s) at state 1

D_0 is the diameter (m) of the water entrance line

ρ_L is the density (kg/m^3) of the water entrance line

ρ_{TP} is the density (kg/m^3) of the two phase mixture in flat panel

H_{FP} is the height (m) of the water level in flat panel

Conservation of mass from state 0 to 1 yields:

$$\rho_L A_0 V_0 = \rho_L A_0 V_1 \qquad [3]$$

Where:

Area of the water entrance line (m^2): $A_0 = \pi D_0^2/4$ \qquad [4]

Therefore:

$$V_0 = V_1 \qquad [5]$$

Conservation of momentum from state 1 to 2, neglecting friction in this transition:

$$P_2 = P_1 - \rho_{TP} V_1 (V_2 - V_1) \qquad [6]$$

where ρ_{TP} is the homogeneous density of the two-phase flow. Since the velocities of each phase in the region between 1 and 2 are approximately equal (slip, S=1) a homogeneous density is used in this momentum equation. This expression for the homogeneous density can be found from the conservation of mass from 0 to 1.

Conservation of mass from state 0 to 1 for the system yields:

$$\rho_L A_0 V_0 = \rho_{TP} A_0 V_1 \qquad [7]$$

The homogeneous density follows from this equation after substituting for the Areas at state 0 and state 1:

$$\rho_{TP} = \frac{\rho_L A_o^2 V_0}{A_1^2 V_1}$$ [8]

At this point, the two-phase flow terminology from Table 1 is needed to proceed because the flow in the lift tube is most clearly defined in these terms. The definitions of superficial velocities and void fraction can be related to the terminology used thus far.

Since states 0 and 1 are under liquid conditions:

$$V_0 = \frac{Q_L}{A_0}$$ [9]

While the definition of the superficial liquid velocity, j_L is:

$$j_L = \frac{Q_L}{A}$$ [10]

Therefore:

$$V_1 = \frac{Q}{A_1}$$ [11]

Additionally, state 2 has two phases, but V_2 still describes the total average velocity of the mixture:

$$V_2 = \frac{Q_L + Q_G}{A} = \frac{Q}{A_2}$$ [12]

This is precisely the definition of j. Therefore:

$$V_2 = j$$ [13]

It follows from equations [11] and [13] that:

$$V_2 - V_1 = j - j_L \left(\frac{A}{A_0} \right)$$ [14]

Also, the void fraction is defined as the average cross sectional area occupied by the gas divided by the total cross sectional area of the pipe.

Therefore:

$$\frac{A_L}{A_2} = 1 - \varepsilon \tag{15}$$

Now the momentum equation in the lift tube (from state 2 to P_{sys}) can be stated as:

$$P_2 = P_{sys} + f_{TP}\frac{\left(\rho_L j_L + \rho_G j_G\right)^2}{2\rho_{TP}}\left(\frac{L}{D}\right) + \rho_L Lg(1-\varepsilon) \tag{16}$$

where f_{TP} is the two-phase friction factor, based on average properties of liquid and gas and ρ_{TP} is the two-phase density of the fluid mixture in the lift tube. Here, for the frictional pressure drop term, a two-phase density is required instead of a homogeneous one since there is now slip between the two phases. This two-phase density can be found from the density definition applied to the lift tube volume:

$$\rho_{TP} = \rho_G \varepsilon + \rho_L (1-\varepsilon) \tag{17}$$

Therefore, combining Equations [1], [2], [5], [6] and [16], a general equation for the submergence ratio (H/L), which describes the average pressure gradient along the lift tube, can be solved as:

$$\frac{H}{L} = \frac{f_{TP}\left(\rho_L j_L + \rho_G j_G\right)^2}{2gD\rho_L\rho_{TP}} + \frac{j_L^2\left(\dfrac{D}{D_0}\right)^4}{2gL} + \frac{j_L\rho_{TP}\left(\dfrac{D}{D_0}\right)^2\left(j - j_L\left(\dfrac{D}{D_0}\right)^2\right)}{\rho_L gL} + (1-\varepsilon) \tag{18}$$

THE DRIFT FLUX MODEL

The drift flux model is now the widely accepted method for analyzing void fractions in two-phase flow. This method, formalized by Zuber and Findlay in 1965, provides a means to account for the effects of the local relative velocity between the phases as well as the effects of non-uniform phase velocity and concentration distributions.

While many others contributed to the beginnings of two-phase flow theory, Zuber and Findlay's (1965) analysis establishes the basis of the drift flux formulation used today (Chexal 1997). It relates the average gas void fraction of the two-phase flow to: 1) the superficial velocities (the velocity each phase would have if they occupied the entire area of the pipe alone) of the gas and liquid phases; 2) C_o, the distribution parameter; and 3) V_{gj} ($= V_G - j$), the drift velocity. The resulting drift flux model can be summarized by the following equation:

$$\varepsilon = \frac{j_G}{C_o(j_L + j_G) + V_{gj}} \tag{19}$$

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Many authors have formulated empirical correlations for C_0 and V_{gj} depending on the two-phase vertical flow regimes shown in Figure 5 and other parametric effects. In the current study, the diameter of the lift tube and surface tension are two important parameters of the bubble pump design that could potentially increase the efficiency of the pump. Therefore, the correlation of de Cachard and Delhaye (1996), which took surface tension effects into account, is used for the slug flow regime. The de Cachard and Delhaye empirical correlations for V_{gj} and C_0 are:

$$V_{gj} = 0.345\left(1 - e^{-0.01N_f/0.345}\right)\left[1 - e^{(3.37-Bo)/m}\right]\sqrt{gD}$$ [20]

$C_0 = 1.2$

Where:

$$\left(N_f\right)^2 = \frac{\rho_L(\rho_L - \rho_G)gD^3}{\mu_L^2}$$ [21]

Bond number:

$$Bo = \frac{(\rho_L - \rho_G)gD^2}{\sigma}$$ [22]

And m is defined for different ranges of N_f:

$N_f > 250$:

$$m = 10$$ [23a]

$18 < N_f < 250$:

$$m = 69\left(N_f\right)^{-0.35}$$ [23b]

$N_f < 18$:

$$m = 25$$ [23c]

It is expected that the system will also experience bubbly and churn flow regimes, thus correlations are needed to define the transitions between bubbly, slug and churn along with correlations for the drift flux velocity and C_0 for the bubbly and churn flow cases.

The transitions between flow regimes are often determined by void fraction ε (Taitel and Bornea, 1980). Taitel and Bornea (1974) found that in bubbly flow $\varepsilon < 0.25$, $\varepsilon = 0.25$ at slug flow regime, and $\varepsilon > 0.25$ during churn flow. Although for most cases bubbly flow happens when the void fraction is less than 0.25, the flow pattern varies when diameter of the lift tube changes. Thus, Hasan's (1987) correlation was used in the study for transition between bubbly flow and slug flow. Hasan defines the relative velocity of the vapor bubbles, U_0, and the larger coalesced Taylor bubble, U_G, in the flow as follows:

$$U_o = 1.53 \left[\frac{g \ \rho_L - \rho_G \ \sigma}{\rho_L^2}\right]^2 \qquad\qquad\qquad [24a]$$

$$U_G \cong 0.35 \ \overline{gD} \qquad\qquad\qquad\qquad\qquad [24b]$$

Bubbly flow then occurs when the Taylor bubble outruns the gas bubbles and thus the smaller bubble: or $U_o < U_G$. In this case the correlations for bubbly flow are:

$$C_0 = 1.2$$

$$V_{gj} = 0.43 * U_G/(j_G - 0.36 * U_G) \qquad\qquad [25]$$

Slug flow occurs when the vapor bubbles run into the back of the forming Taylor bubble, thus $U_o > U_G$, and then the previous correlations for C_0 and V_{gj} can be used.

For the transition from slug flow to churn, the procedure from Hewitt (1965) was followed. Hewitt found that the transition between slug flow and churn flow could be predicted for a particular system using the following set of equatins:

$$\theta = \ \overline{j_{bx}} + 0.96 \ \overline{j_{fx}} \qquad\qquad\qquad [26]$$

Where

$$j_{bx} = j_b \ \overline{\rho_g/gD(\rho_l - \rho_g)} \qquad \text{and} \qquad j_{fx} = j_f \ \overline{\rho_l/gD(\rho_l - \rho_g)}$$

$$[27]$$

White (2001) found that slug-churn transition occurred at a value of 0.83 for θ in a similar bubble pump system. The equations then used for churn flow were (Hasan,1987):

$$\theta > 0.83$$

$$C_0 = 1.15$$

$$V_{gj} = 0.345 * \ \overline{g * D * (\rho_L - \rho_G)/\rho_L} \qquad\qquad [28]$$

The working fluid used in the current study is water. The SHWS modeled runs under a vacuum pressure of 20-25 inches of mercury. While the model of the solar thermal water heating systems require a solar flat plate panel collector to collect solar energy and heat up water in the panel, it is assumed that the panel is about 50% efficient and can collect a theoretical heat input of $700W/m^2$ from a standard 3 m^2 panel, and the temperature of the fluid entering the lift tube is at the saturated temperature under these pressure and heat flux conditions.

The efficiency of the solar thermal system is measured by the mass flow rate of the hot water output of the bubble pump as the input to the system is free solar thermal energy. The minimum hot water mass flow rate output requirement from the bubble pump is 1 liter per minute for two lift tubes.

To solve all of the non-linear equations, Engineering Equation Solver (EES) software is used. EES is an equation solver software that can iteratively solve thousands of linear or non-linear equations simultaneously. It has built in libraries for thermodynamic and fluid transport properties, thus it is widely used in the Mechanical Engineering field. It can also solve differential and integral equations, which is helpful for the optimization of parameters for the solar thermal bubble pump water heating systems.
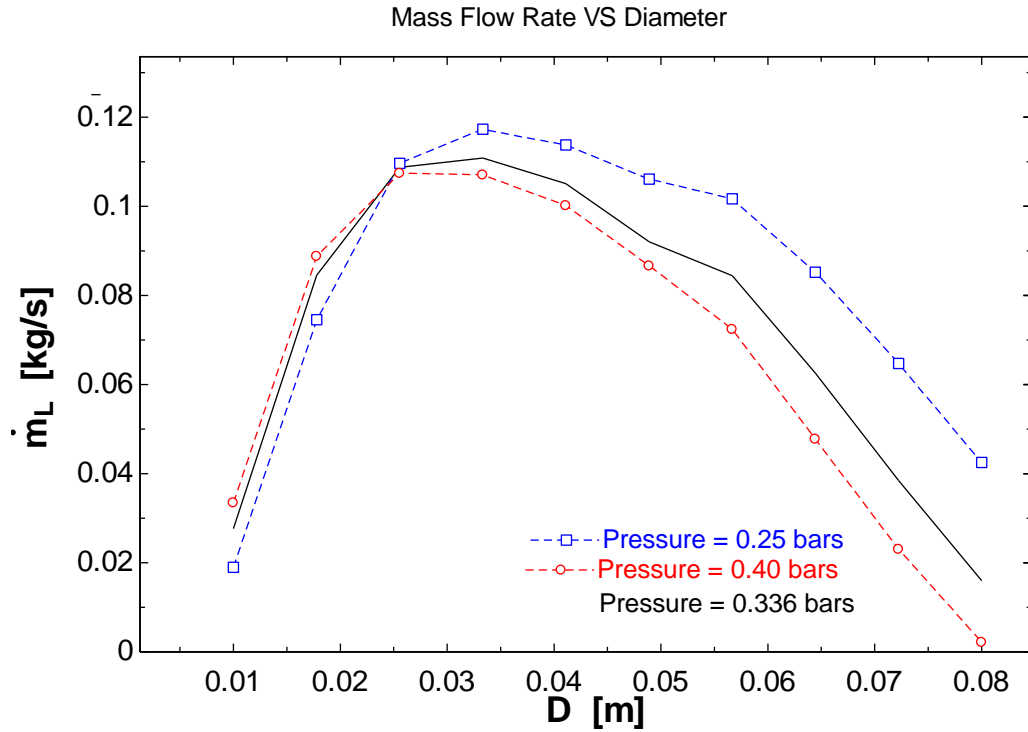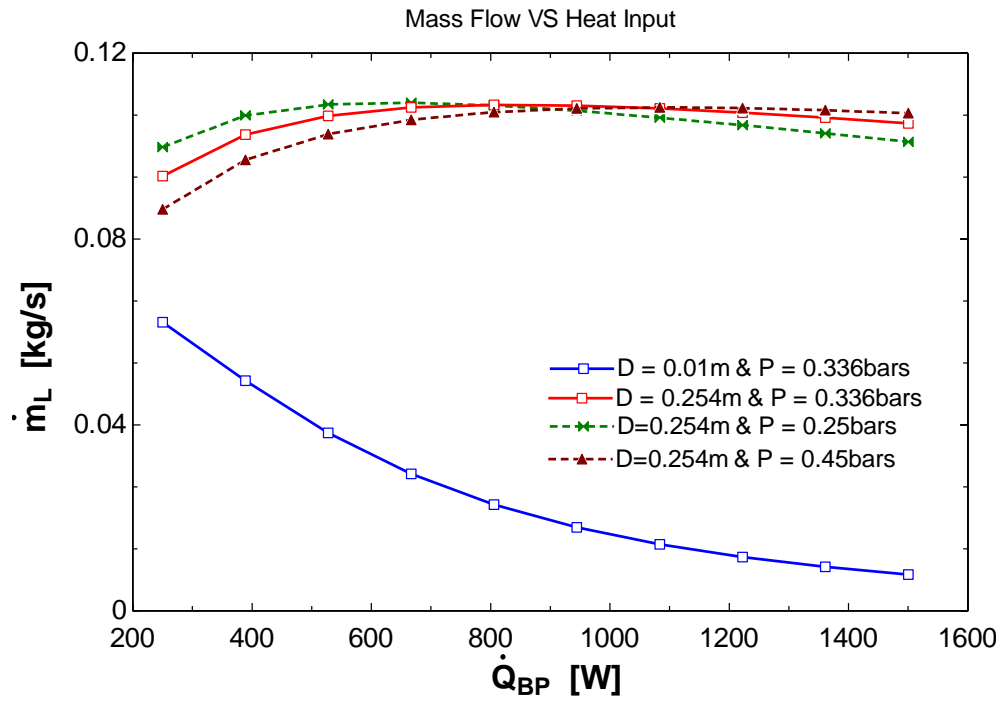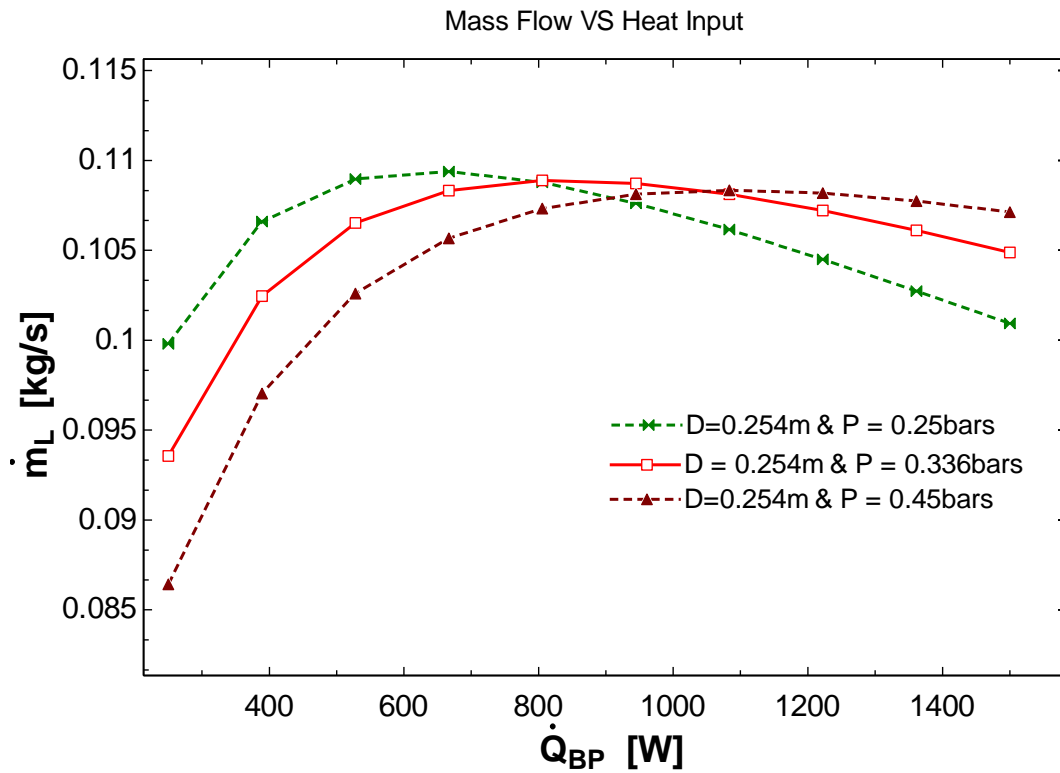

Figure 7: Liquid Mass Flow Rate Versus Lift Tube Diameter for Varying System Pressure Conditions.

Figure 8a and b: Liquid Mass Flow Rate Versus Heat Input to the Bubble Pump for Different Lift Tube Diameters and System Pressure Conditions.
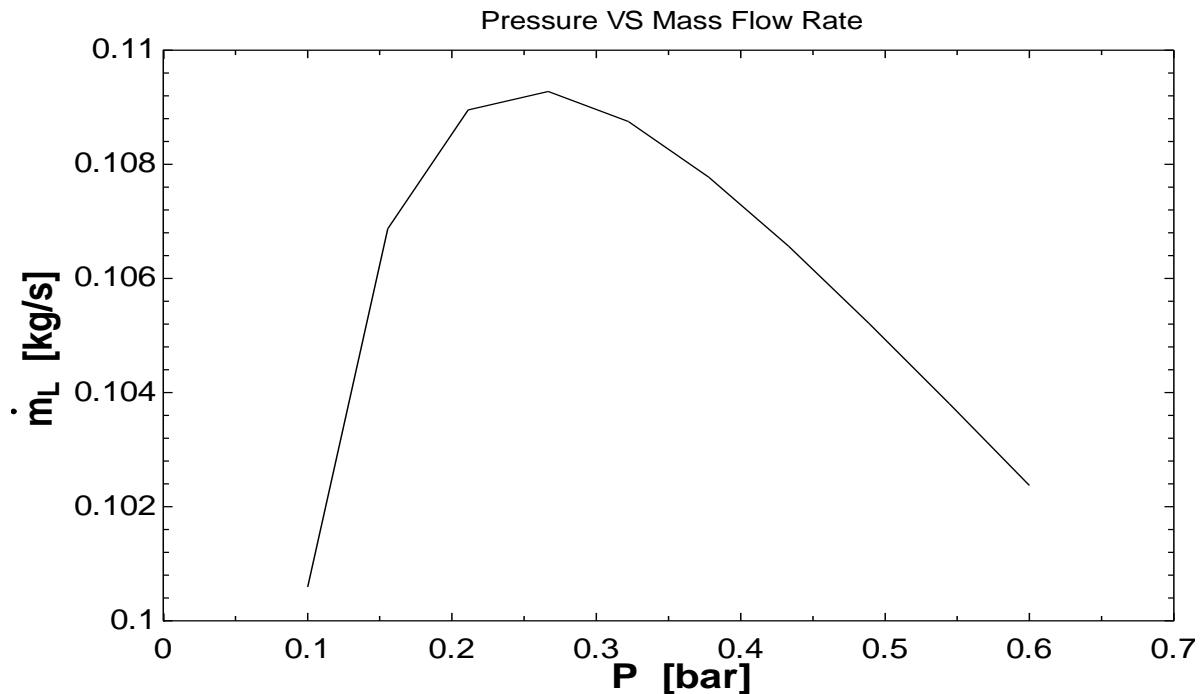
Figure 9: Liquid Mass Flow Rate Versus System Pressure with Lift Tube Diameter of 1 inch

Figures 7 through 9 show the results of parametric studies for the bubble pump design for integration with a solar thermal hot water heating system. As shown in Figure 7, as the diameter for a bubble pump design increases, the mass flow rate of the liquid being pumped through the system increases to a peak value and then decreases again. As this occurs, the two phase flow regime changes from churn to slug and lastly to bubbly flow. With a lift tube 1 cm in diameter, the system is operating in churn flow at an average solar energy input of 700 W/m^2 and the output flow rate is 1.8 liters per hour. A lift tube of diameter of 3 cm will result in the highest hot water mass flow rate output of about 7 liter per hour. However, it is unrealistic to have such high solar energy input throughout the day everyday. Figure 8 shows the variation in liquid mass flow rate or a range of heat transfer rates into the system. As the diameter increases more, the two phase flow regime becomes bubbly flow. Thus, having a lift tube of just less than 3 cm, for instance 1 inch in diameter, will likely produce more consistant output from the bubble pump SHWS throughout the year while receiving the benefit of an output flow rate of 6 to 6.5 liter per hour. As the temperature in the day fluctuates, the pressure inside the system also changes; however, the pressure in the system can be controlled by the valve in the header where the vapor collects after the pump. As shown in Figure 9, as the pressure of the system becomes a stronger vacuum, the saturated temperature for water decreases, and the system will require less solar energy input to pump water. As the pressure increased to 0.45 bars, the mass flow rate increased slightly with a smaller diameter lift tube, whereas, the larger diameter lift tubes' mass flow rate decreased compare to the 0.366 bar case. On the other hand, the mass flow rate decreases as pressure increases at a lower solar energy heat input. With a pressure of 0.25 bars, the output mass flow rate of the system also provides about 6.5 liter per hour of hot water output at an average solar energy input. Although pressure is an important parameter of the system, with the optimized tube diameter, the pressure of the system has less effect on the system. As temperature

fluctuates throughout the day, the hot water mass flow rate output also varies. At a constant pressure of 0.25 bars of the system, and lift tube diameter of 1 inch, it is found that the maximum mass output flow rate occurs at 800W/m^2, which is consistent with the other results of at least 6 liter per hour of hot water output.

CONCLUSIONS AND RECOMMENDATIONS FOR FUTURE WORK

The model results showed that having a 1 inch lift tube operating at a pressure of 0.25 bars can boost up the mass flow rate output to 6 liter per hour, which is about 6 times the required output. Further study can be done to more effectively simulate the system by adding in models of the solar panel, the time varying impacts of the solar insulation fluctuation, and additional lift tubes to study the detailed optimization of the bubble pump SHWS. Experimental performance should be compared with the resulting model before further analysis and implementation of system changes.

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