Making a Difference, Having an Impact on North Carolina

From the mountains to the coast, Carolina graduate students’ research benefits North Carolina communities. Now, this new Impact Award recognizes and encourages graduate students whose research is making a difference to our state. Impact Awards are privately funded through generous contributions from the members of the Graduate Education Advancement Board of the Graduate School and by the Graduate School.

Impact Award winners present their research, receive a cash award, and are recognized at the Annual Graduate Student Recognition event, this year on April 12, 2007, 3-6pm, at the George Watts Hill Alumni Center on the Carolina campus. A faculty review committee selected 10 projects to receive Impact awards and 10 additional projects (12 students) to receive Recognition Awards.

This report briefly describes these research projects, which reach from one end of North Carolina to the other. They affect the economic development of our state, the quality of health and human services delivered to our citizens, and the quality of our educational systems and environmental resources. Carolina graduate students’ research is clearly making a difference in the lives of North Carolinians across the state and beyond.

We hope you enjoy reading about the work of these exceptionally talented Carolina graduate students. These students, and many others like them at the University of North Carolina at Chapel Hill, are actively helping the residents of this state through their research. If you’d like to hear more about the research of Carolina graduate students, many of them are available to speak with your community group. For more information, please go to our webpage: http://gradschool.unc.edu/ or contact us.

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Allison Anders researched the relationship between delinquency and education through extensive study of a unique program for incarcerated young adults in North Carolina.

The century between the end of the Civil War and the 1970s showed markers of progress toward a penal system in North Carolina that intended to heal rather than avenge. This trend reversed in the 1970s and the state resumed executions in 1984. To critics, the South embodies everything that is wrong with the death penalty — in addition to killing a disproportionate number of people, southern states execute the poor, the underprivileged, the uneducated, the disempowered, and, at worst, the innocent, with racial and class dynamics playing key roles.

Seth Kotch, a doctoral student in History, utilized archival research, statistical analysis, close readings of art and literature, an execution database, and theory in an effort to explain this surprising change that set North Carolina out on a new, more violent path. His evolutionary study sought to find out why, to describe the complex relationship between culture and policy, and to restore some uncertainty to North Carolina's history. This uncertainty fills a gap in scholarship on the state's history and places emphasis on the discontinuity of history, its unpredictability, and the ways in which bureaucratic inertia, inept management, and human disinterest can drive or suppress change as effectively as cultural beliefs or social movements.

2007 GEAB Impact Award Winners

Education

Seth Kotch, History
Capital Punishment and Southern Culture in 20th-Century North Carolina

Researching negative school experiences is critical in the study of delinquent behavior. Studies indicate repeatedly that low school performance, truancy and school leaving at a young age are factors related to juvenile delinquency, which often leads to incarceration in correctional institutions.

Doctoral student Allison Anders studied more than 330 student-inmates who participate in the North Carolina Workplace and Community Transition Youth Offenders Program (WCTYOP) at correctional institutions across the state. The program includes college courses, career counseling courses and behavioral management courses for incarcerated men and women aged 18 to 24. Her evaluation found that the recidivism rate of program participants is only 34%, considerably less than the national average of 67%.

Through her survey data, ethnographic data, case studies and in-depth interviews, Allison found that the majority of student-inmate program participants, who previously had quite negative school experiences while growing up in North Carolina, not only came to value education but expressed a commitment to future post-secondary education as well as the desire to contribute positively to their communities post-release. They disclosed that effective curriculum, active learning environments and individual attention are important elements in learning environments. The impact of this research is two-fold: it provides a research-based analysis that supports a unique correctional education program, and adds valuable perspectives to education school curriculums, particularly the study of at-risk-students.
Economic Development/Environmental

Tamara Tal, Toxicology
Particulate Matter and Air Pollution

Exposure to air pollution composed of particulate matter (PM), which can be produced by the incomplete combustion of fossil fuels, is associated with an increased risk of cardiopulmonary disease and mortality. Strikingly, exposure to ambient particulates may contribute to more than half a million cardiopulmonary deaths worldwide each year. The means by which particles exert toxicity in the human lung is poorly understood. However, inflammation is thought to be an underlying mechanism by which PM might trigger a cardiopulmonary attack.

Tamara Tal, a doctoral student in Toxicology, investigated the way PM induces pro-inflammatory signaling in human lung cells, which serve as the first line of defense against inhaled toxins. Her research examined the effect of PM-induced aberrant cell signaling mechanism(s) leading to pro-inflammation. She also investigated whether different forms of PM, including metals and diesel exhaust, were similarly capable of triggering pro-inflammatory signaling in human lung cells.

Several North Carolina counties exceed the national standards for ambient PM, and the state’s expanding population is expected to create more due to more vehicular traffic, power demands and industrial activities. Tamara’s data provide insight into the mechanism by which PM may induce pulmonary inflammation and describe methods to determine its relative toxicities.

Allan Mathew Freyer, City and Regional Planning
Resources to Recover: A Policy Tool for Responding to Economic Disasters

Following the closure of the Pillowtex plant in Cabarrus County in 2003, state and community leaders began to use the term “economic disasters” to describe the devastating effects that mass layoffs have on the dislocated workers who lose their jobs and on their communities. Many of these dislocated workers face significant barriers to re-employment and daunting financial, human and social service needs.

Graduate student Allan Freyer worked with the North Carolina Rural Center for Economic Development to research and develop a new nonprofit-centered economic disaster response program. Using the Pillowtex experience as a guide, Allan created a framework called the Resources to Recover program, or R2R, to act as a labor market intermediary between dislocated workers and the state’s workforce development system.

The NC R2R would seek to engage with local nonprofit and faith-based networks in the aftermath of an economic disaster to mobilize their local affiliates; hold regular meetings for relevant nonprofits and workforce board representatives, and hold post-disaster meetings to discuss strategies for connecting workers to the workforce development system. Allan’s research indicates that before, during and after economic disasters, it is critical that these organizations network together and with the state’s workforce system. As institutional networks, they would help displaced North Carolinians navigate what is often a bewildering maze of information to secure the job-training resources they need for long-term economic recovery.
Stephen Whitlow, City and Regional Planning
Urban Distressed Communities in North Carolina

Stephen Whitlow, a recent master’s student in City and Regional Planning, co-authored a report that pinpointed distressed urban and rural communities in the state. The report measured indicators of distress at the census tract level as opposed to the county tract level, suspecting that analyses at the county level were too broad to get an accurate measure of distress. County level analyses statically dilute the prevalence of distress in urban communities because of the surrounding suburban wealth, lending support to the incorrect assumption that economic distress in North Carolina is primarily a rural phenomenon.

Measurements at the census tract level covered the entire state and were based on a composite score that included criteria of poverty, unemployment and per capita income. He found that North Carolina contains a total of 147 distressed tracts. Of those, 86 are urban distressed tracts and 61 are rural distressed tracts. His project also examined the characteristics of urban distress such as race, economics, education levels, family type, and housing.

Stephen’s research showed that there are areas of extreme privation in North Carolina cities, and that these areas rival if not surpass the conditions prevalent in rural North Carolina. Stephen’s project informed the renewal of the William S. Lee Act that created the Urban Progress Zones in July 2006.

Health and Social Services

Lynette Phillips, Epidemiology
Hormonal and Reproductive Risk Factors and Breast Cancer

Doctoral student Lynette Phillips conducted research on reproductive and hormonal risk factors for DCIS and invasive breast cancer in a population of North Carolina women to determine which types of DCIS had similar risk factors to those of invasive disease. Risk factors analyzed for the study were number of full-term pregnancies, lactation, oral contraceptive use, hormone replacement therapy, age at menopause and age at menarche.

Her results showed that risk factors for the more aggressive DCIS subtype (no full-term pregnancies, older age at first full-term pregnancy, no breastfeeding, and more than ten years of oral contraceptive use) mimicked those of invasive breast cancer, suggesting that the two subtypes of DCIS are distinct and perhaps should not be treated the same way.

Reducing severe treatments for less aggressive DCIS would have a direct impact on North Carolina’s economy as well as the health of North Carolina women.
In North Carolina, more than 25,000 prisoners are released back into their communities each year, and the number of individuals in the state with a history of incarceration is substantial. Despite a heavy burden of diseases among released prisoners, few studies have examined mortality among this population. Most studies comparing the burden of disease across inmate and community populations have focused on infectious diseases and mental health disorders, including HIV, Hepatitis C and schizophrenia.

David Rosen, an MD/PhD student in Epidemiology/Medicine, examined death rates in order to identify specific lapses in the provision and linking of correctional and community health care. His study, which took into account age, race, gender, and poverty, measured the burden of mortality as well as the causes of mortality among former inmates. The excess mortality among former inmates from disease common among prisoners is suggestive of inadequate access to medical care, and, in some instances of non-natural deaths, of inadequate support services.

With former inmates dying nearly two decades before other North Carolinians, the effect of mortality may have a powerful destabilizing effect on NC families and communities. Given North Carolina’s large and expanding prisoner population, the results of David’s research suggest policy implications for the health of former North Carolina prisoners, their families, and their communities.

David Roberts, Psychology

Improving Social Functioning in Schizophrenia Patients

Social dysfunction is a key unmet need among individuals with schizophrenia. In North Carolina, approximately 1% of individuals, or 85,000 suffer from this crippling illness, which renders many sufferers unable to meet their basic living needs and dependent on public insurance and services. Most treatments for schizophrenia target only the psychotic symptoms of the illness, yet social dysfunction (e.g. poor social skills, restricted interpersonal activity, unemployment) is among the hallmark features of schizophrenia.

David Roberts, a doctoral student in Clinical Psychology, developed Social Cognition and Interaction Training (SCIT) along with his mentor, David Penn. SCIT is a group psychotherapy designed to improve social functioning in schizophrenia through improved social cognition: the ability to infer the mental states, emotions and intentions of others. Beyond improving social cognition, SCIT is designed to help patients apply these skills in their own lives. The techniques, including specially-produced video vignettes, betting games and guessing games, are designed to be dynamic and engaging. David is also collaborating with UNC’s Division TEACCH to adapt the SCIT treatment for adults with autism spectrum disorders.

David’s schizophrenia studies are ongoing in several sites around the state, and client feedback has been almost universally positive. His group psychotherapy treatment may improve outcomes in this illness, save state dollars, and meet the expressed needs of North Carolinians with schizophrenia.
Danielle Haley, Health Behavior and Health Education
Release Programs for HIV-infected Inmates: Implications for North Carolina

HIV-infected former inmates in North Carolina face multiple barriers to accessing health care and to successful re-entry into their communities upon release. In order to explore HIV-infected inmates’ perceptions and thoughts regarding this transition, recent master's student Danielle Haley collaborated with members of the UNC Center for AIDS Research Criminal Justice Working Group to create a qualitative study called RELEASE.

Danielle’s interviews showed overwhelmingly that participants viewed their histories of substance abuse, violence and the struggle to avoid prior drug-related and criminal behavior as critical barriers to staying healthy and successfully re-integrating into their communities. Substance abuse in particular was singled out as a barrier to maintaining employment, stable housing, family relationships and HIV and other health-related issues. Findings suggest a need exists for more intensive release programs that provide not only HIV-related care and support services, but also focus on substance abuse and related coping strategies that span both pre- and post-release.

More people with HIV and AIDS live in the southeastern U. S. than in any other region in the country. The study benefits North Carolina by highlighting the needs of one of its most vulnerable communities. Given the nature of infectious disease and its spread within communities, increasing the health and well-being of HIV-infected former inmates may have an important impact on both the individual and the families and communities to which they return.

Mileka R. Gilbert, Microbiology and Immunology/Medicine
Understanding the Mechanisms Regulating Autoimmune Reactions in Lupus

Systemic Lupus Erythematosus (lupus) is an autoimmune disease that affects many organ systems in the body. It strikes predominantly women in their child-bearing years and disproportionately affects African American women. Lupus results from the breakdown of mechanisms governing the activation of autoantibody B cells. The cause of the breakdown is unknown although it has been studied for more than 20 years.

Carolina MD/PhD student Mileka Gilbert is studying the mechanisms that regulate these B cells. Following her lab’s identification of a novel mechanism of regulating the cells, her research confirmed that the regulatory mechanism was defective in lupus-prone mice. Currently, the standard of care for lupus is immunosuppressive drugs that not only target B cells but all immune cells that protect people against pathogens. A potential more specific cure for disease would be stem cell transplants that generate the cells necessary to restore the regulation autoreactive B cells.

The disease affects up to 1.5 million people in the United States. Symptoms of lupus include skin rash, photosensitivity, oral ulcers, arthritis, kidney, brain, heart and blood disease. In severe cases, mortality usually results from kidney disease. North Carolina, with its large African American population, stands to benefit from Melika’s research, which may lead to new therapeutic treatment strategies for lupus and a potential cure for the disease.
The development of different types of aggressive behavior during adolescence has not been adequately studied, particularly in rural areas. Recent doctoral candidate Katherine Karriker-Jaffe examined gender differences in youth violence, using data from three rural counties in central North Carolina to examine the development of aggression during adolescence and to assess factors that influence that development.

Katherine used advanced statistical modeling procedures to describe patterns, or trajectories, of physical aggressions (such as fighting) and social aggression (such as spreading rumors) for boys and girls aged 11 to 18. She studied family and neighborhood risk factors such as family conflict, parent-child bonding, parental monitoring, and socioeconomic disadvantage (education, unemployment and income levels). Boys and girls followed similar aggression trajectories, with neighborhood and family factors being important influences, although contextual factors varied between the genders. Neighborhood socioeconomic disadvantage had the strongest influence on the girls’ trajectories, and family factors were more influential than neighborhood risk factors. Most of the significant predictors impacted levels of aggression at age 11.

Youth aggression has been targeted for reduction by state, national and global initiatives. Katherine’s findings can inform state policy makers, school personnel and public health leaders. Results of her research suggest that early prevention programs are needed in rural North Carolina to reduce the burden of youth violence.

Katherine Karriker-Jaffe studied the influence of neighborhood and family risk factors on youth aggression.
Kelly Kandra, Psychology  
*Teenage Tobacco Use, Prevention and Cessation and the TRU Campaign*

With teenage smoking rates having little decline in the late 1990s, North Carolina in 2001 implemented an initiative focused on teenage tobacco use, prevention and cessation. One component of this initiative is Tobacco.Reality.Unfiltered. or TRU, an anti-tobacco statewide media campaign aimed at North Carolina youth aged 11-17 years. The primary goals are to prevent the initiation of tobacco use, especially cigarette smoking, among youth; to build ad and brand awareness; ensure positive reactions to the campaign; and positively influence youth attitudes against smoking.

With the campaign currently in its third year, doctoral student Kelly Kandra studied the first two years of the campaign. Her evaluation centered on a longitudinal phone survey for which she served as project manager and lead data analyst. Findings indicated that overall, youth awareness of this campaign is at a moderate level and increasing over time. The health information has the capacity to spread to other youth through social networking. The ads were well received without the use of an industry manipulation theme, which even though can be effective is politically infeasible in a tobacco-producing state.

Youth reported very strong attitudes against tobacco use at baseline and across all waves of data collection. With youth responding positively and having increased awareness of the ads over time, the TRU campaign has the potential to meet its long-term goal of decreasing tobacco use in North Carolina teenagers.

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Economic Development/Environment

Brittany Friars Whitmire, Public Administration  
*Who Will Fill the New Boots? Succession Planning in Farm Businesses*

Organizations that systematically adopt succession planning practices to address changeovers in key personnel will be better able to maintain their competitiveness and stability. North Carolina’s agricultural sector is one in which systematic succession planning has been rare or nonexistent. This sector, which includes production farming and agribusiness, is a key component of the state economy that affects hundreds of North Carolina communities and their local governments.

Recent master’s student Brittany Whitmire looked at the status of succession planning in farm businesses through a comparative case study of three farms in tobacco-dependent Greene County. Based on the findings, she developed a customized five-step model of succession planning to meet the unique needs of farm managers facing intergenerational transitions in their farming operations. Cases were classified as novice, intermediate or advanced, based on the number of steps that were undertaken in Whitmire’s model. Despite the variation in the sample, each case illustrated the applicability of generally accepted succession planning steps when they are tailored to meet the specific needs of the individual farm business.

Continuity in leadership in North Carolina’s agricultural sector is critical, as it contributes nearly $63 billion to the economy. Brittany’s Farm Business Succession Planning Model can have an impact on the sustained performance of North Carolina’s farm businesses and the economic health of the state.
Jennifer C. Carter, Molecular and Cellular Pathology
Diet, Obesity and Breast Disease

North Carolina reports approximately 5,260 new cases of breast cancer yearly, and according to the Centers for Disease Control, in 2004, 61% of North Carolinians were overweight or obese. Recent epidemiological studies attribute diet and obesity to the development of cancers, including breast cancer, although the cellular mechanisms of the relationship are not well understood.

Jennifer Carter, a doctoral student in Molecular and Cellular Pathology, studied the link between diet, obesity and breast cancer. A number of factors contribute to tumor invasion and metastasis in breast cancer. Her hypothesis was that certain lipids cause changes in the breast tissue microenvironment, promoting invasion. She proposed a mechanism whereby diets high in certain fatty acids triggered a reaction in adipocytes (fat cells) and tumor cells, in turn permitting tumor cells to degrade surrounding tissue and metastasize.

With such a large breast cancer patient population and large population of overweight or obese adults in North Carolina, it is important to study mechanisms governing breast cancer development. Jennifer’s research has the potential to impact prevention and treatment of breast cancer in the state.
Laura DiMichele, Pathology and Laboratory Medicine  
Fighting Cardiovascular Disease: The Role of the Focal Adhesion Kinase Protein

More than 18,000 North Carolinians die each year from cardiovascular disease. It is the nation’s as well as North Carolina’s leading cause of death for both men and women of all ages. It can present itself in many forms, including heart failure in which the heart becomes weakened due to increased workload and cannot effectively pump blood to other organs of the body.

While a great deal of research has been done on the causes of heart disease, much is still unknown. Recent doctoral student Laura DiMichele hypothesized that a specific protein, Focal Adhesion Kinase (FAK), plays an important role in increasing heart size, known as cardiac hypertrophy. Using a genetically engineered mouse line, she explored the role of FAK in the adult heart and found it to be involved in the progression of cardiac hypertrophy. At first, this enlargement of the heart helps to improve heart function. However, if not alleviated, it can lead to weakening of the heart and eventual heart failure.

More than 83% of adults in North Carolina have one or more risk factors that lead to cardiovascular disease, solidifying the need for increased patient care and new treatments for the disease. Laura’s novel approach at studying molecular mechanisms of the disease can provide a link between basic science and clinical medicine as well as a therapeutic benefit to the people of North Carolina.

Emily Bobrow, Maternal and Child Health and Melissa Roche, Health Behavior and Health Education  
Intimate Partner Violence in Health Care Settings

Intimate partner violence (IPV) is a serious public health problem affecting thousands of North Carolina women. Because female victims of IPV often access health care through emergency departments, it is important to understand the best type of support to provide, according to their readiness to disclose the abuse and take action to leave the relationship.

Doctoral students Emily Bobrow and Melissa Roche collaborated on a research project that compared the perspectives of IPV survivors and emergency department nurses. They found three primary themes: women’s fear of abusive partners is coupled with love and dependency, and they desire support that respects these complexities; IPV survivors and nurses agree that it’s the nurse’s responsibility to continue to ask and offer support even if the victim denies abuse, although they differed on how they should follow up; and that IPV survivors emphasize the importance of emotional support as primary in all stages of readiness, while nurses expressed emotional support only as secondary.

The results of Emily and Melissa’s study were used to write a participatory performance play, which has been shared in multiple venues as a way to raise awareness and increase dialogue on the problem of intimate partner violence. Their project sheds light on the way health care providers give support to IPV survivors in the emergency room.

Ashley Garrett Rivenbark, Toxicology  
Mechanisms of Gene Regulation in Breast Cancer

Breast cancer is the most common cancer among women worldwide, affecting one in eight women. Improvements in our ability to prevent, diagnose, and treat the disease require a greater understanding of the molecular basis for breast carcinogenesis.

Cancer is a disease of abnormal gene expression and epigenetic (non-mutational) mechanisms account for the majority of gene expression changes. Carolina doctoral student Ashley Rivenbark investigated the role of DNA methylation in breast cancer, which accounts for most epigenetic gene silencing. DNA methylation leads to decreased levels of expression or silencing of specific genes, just like a mutation. The aim of her research was to identify new gene targets for DNA methylation, establish a new model for gene silencing, and perform detailed analysis of a breast cancer tumor suppressor gene.

Ashley’s project advances the body of knowledge of epigenetic mechanisms and may significantly impact North Carolina through improved breast cancer treatment and identification of new gene targets for drug development by the state’s pharmaceutical industry.
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