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A Multi-Vitamin for the Built Environment: Exploring how a Multi-Sectoral and Multi- Institutional Partnership Links Health and the BeltLine

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A MULTI-VITAMIN FOR THE BUILT ENVIRONMENT

Exploring how a Multi-Sectoral and Multi-Institutional Partnership Links Health and the
BeltLine

by

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B.S., UNIVERSITY OF MIAMI

A Capstone Submitted to the Graduate Faculty of the Georgia State University in Partial
Fulfillment of the Requirements for the Degree

MASTER OF PUBLIC HEALTH

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A MULTI-VITAMIN FOR THE BUILT ENVIRONMENT: Exploring how a Multi-Sectoral and Multi-Institutional Partnership Links Health and the BeltLine (Under the Direction of Professor John Steward)

Abstract

The Atlanta BeltLine is an innovative redevelopment project re-shaping Atlanta residents' access to, multi-use trails, parks, public transportation, housing and employment opportunities. The primary purpose of this project was to develop a research proposal to study and analyze the health benefits associated with multi-use trails within BeltLine communities. A secondary purpose of this project was to evaluate the multi-sectoral and multi-institutional partnership that was formed to develop the research proposal and study the influence of the BeltLine on health outcomes. In August 2010, representatives from the Centers for Disease Control and Prevention, Emory University, Georgia Institute of Technology, Georgia State University, the Atlanta BeltLine Inc. and the Atlanta BeltLine Partnership formed the BeltLine Health Proposal Committee. Two online surveys using Survey Monkey were conducted to evaluate how this committee was operating, if roles and responsibilities were clear and to determine if this committee was an effective mechanism to integrate health and the built environment. Findings from the survey indicated that committee members believed this group was a unique partnership comprised of dedicated professionals sharing a common interest. Survey findings indicated there were several challenges that needed attention including improving communication, resolving competing interests, and identifying a lead organization. Findings from this evaluation can help resolve these issues and help the committee transition into a Health Advisory Group. The Health Advisory Group will serve as formal body that will review research proposals, conduct research, leverage funding and disseminate key health findings related to the BeltLine.

INDEX words: health, built environment, partnership, multi-sectoral, community

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CHAPTER 1 – Background

Health is broadly defined as a “state of complete physical, mental and social well-being and not merely the absence of disease or infirmity” (WHO, 1948). Health encompasses many external factors, including the emerging link with the built environment, extending the possibility of collaboration between sectors, professions and institutions. The title of this project, a multi-vitamin for the built environment, is a metaphor depicting the value added of a multi-sectoral approach to health and built environment issues. Just as multi-vitamins supplement our diets with important minerals and nutrition, the built environment also needs support from a variety of sectors and disciplines to ensure they are designed to promote healthy communities. The primary purpose of this project is to develop and propose an initial study to analyze the health benefits associated with specific aspects of the BeltLine including the influence of multi-use trails on level, intensity and frequency of physical activity. The second purpose of this project is to evaluate a multi-sectoral approach involving a diverse partnership with key stakeholders dedicated to achieving a common goal – healthy, equitable BeltLine communities.

History of the BeltLine

The concept for the Atlanta BeltLine was first proposed in 1999 in a thesis submitted by a Georgia Institute of Technology graduate student, Ryan Gravel. Gravel proposed to utilize the inner railroad corridor to link communities and develop a new transit system. Gravel’s idea inspired the Trust for Public Land to investigate further and conduct a feasibility analysis of connecting parks, transit and trails, which were proposed in Gravel’s thesis. The study conducted in 2004, was called the Emerald Necklace Study and determined the proposed project and outcomes were feasible. In 2005, the Atlanta BeltLine Partnership was formed to collaborate with the Atlanta Development Authority and leverage support for this project from the private

and public sector. Also in 2005, the Atlanta City Council, Fulton County Board of Commissioners and the Atlanta Public School Board of Education approved the use of Tax Allocation Districts (TAD)¹ as the primary funding mechanism for the BeltLine. Finally, in 2006 the Atlanta BeltLine Inc. was formed to oversee the implementation of the BeltLine development activities, engage the community, and collaborate with the City of Atlanta (Atlanta BeltLine Inc., 2011).

The Atlanta BeltLine is a groundbreaking and innovative redevelopment project re-shaping Atlanta residents' access to multi-use trails, public parks, public transportation, housing and employment opportunities (Figure 1). The BeltLine is distinctive in weaving together multiple sectors and has the potential to influence diverse aspects of the built environment: public transportation, housing, employment, access to parks and green space, and connectivity. Atlanta has been craving a cutting edge development project that can help reduce traffic congestion and improve local air quality while making public transit more accessible and encourage walking, cycling and physical activity in the city's urban core. The Atlanta BeltLine is well positioned to have lasting health impacts and unite a variety of sectors and agencies to tackle some of Georgia's most pressing health and development issues.

¹ TAD involves freezing property tax values within the BeltLine development areas of Fulton County. Atlanta Public Schools and Fulton County agreed to receive the same 2005 tax based revenue for the next 25 years. At the end of the 25 years the BeltLine is expected to generate \$1.7 billion from new development within the BeltLine development areas (ABI, 2011)

Figure 1: Conceptual Map of the BeltLine Initiative



Source: Atlanta BeltLine Resource Library, <http://www.beltline.org/ResourceLibrary/Maps/tabid/1823/Default.aspx>

Health Issues in Georgia

The BeltLine has the potential to help Georgia tackle some of its most urgent health issues. The development of multi-use trails can increase physical activity and encourage active transportation. The light rail proposed by the BeltLine can encourage the use of public transit rather than driving alone. Overall, the project aims to increase connectivity and engage communities, which could affect mental health and social capital.

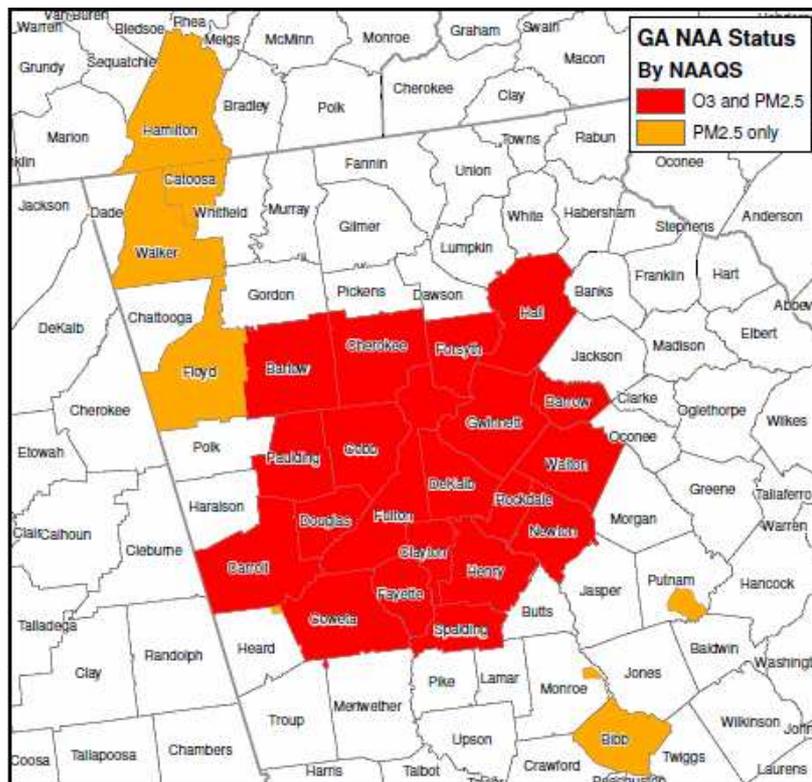
The prevalence of obesity for adults in Georgia is 27%, which is just slightly below the national prevalence of obesity for U.S. adults, which is 33% (CDC 2011, 2010). Obese adults are at greater risk for other health issues and diseases including but not limited to coronary heart disease, type 2 diabetes, cancer, high blood pressure, and osteoarthritis (CDC, 2010). Obesity rates are also an important indicator for health disparities and inequities in accessing health care, healthy foods, and public spaces to engage in physical activity. According to 2009 data from the Behavioral Risk Factor Surveillance System, African Americans were 51% more likely to report obesity, and Hispanics were 21% more likely to report obesity than non-Hispanic white individuals (CDC, 2010).

In addition to poor health outcomes, Atlanta faces some challenges linked to its structural and urban outlay. For example, commuters living in Metro Atlanta spend approximately \$5,772 per household each year on gas, more than any other household in the entire country (Sperling's Best Places, 2010). Since Metro Atlantans spend more on gasoline, they are consequently spending more time in their cars, dependent on motor vehicles as a primary source of mobility. Estimates show that Metro Atlantans waste nearly 44 hours delayed or trapped by traffic each year (Texas Transportation Institute, 2010). Traffic congestion is linked to other aspects of Atlantans daily lives as well as their communities including mental health, physical inactivity and poor air quality.

Twenty seven counties (or select areas within counties) across Georgia are classified as nonattainment zones for failing to meet the air quality standards set by the Environmental Protection Agency (EPA) as a result of pollution levels exceeding state and federal limits (EPA, 2010) (Figure 2). Georgia currently does not meet the air quality standards for ground level

ozone and particulate matter. The Clean Air Act mandates that the EPA defines and monitors air quality standards to safeguard public health and the environment (EPA, 2010).

Figure 2: Map of Nonattainment Counties in Northern Georgia and Southern Tennessee



Source: EPA, Nonattainment areas, <http://www.gaepd.org/air/airpermit/html/planningsupport/naa.htm>

In Georgia, poor air quality is linked to traffic congestion, some natural sources, and a high concentration of coal-fired power plants all of which contribute to high levels of ground level ozone and particulate matter. Ground level ozone, or more commonly known by its street name as smog, is created when nitrogen oxides and volatile organic compounds are joined by the sun's rays (EPA, 2011).² Ground level ozone is not only aesthetically unpleasing, but it can lead to some serious health problems. Health issues related to repeated inhalation or exposure to ground

² Source of nitrogen oxides and volatile organic compounds include vehicle exhaust, industrial emissions, solvents and some natural sources.

level ozone include coughing, chest pains, congestion, and augmented complications related to bronchitis, emphysema, and asthma (EPA, 2010).

In 1990, the Clean Air Act was amended to further restrict harmful emissions, increase air quality standards and establish a program to link transportation planning to air quality improvement. The new program was named the Congestion Mitigation and Air Quality Improvement (CMAQ) program (U.S. Department of Transportation, 2010).³ CMAQ funding is designed to support projects in states or areas that do not meet air quality standards. CMAQ funding supports the state Department of Transportation (DOT) planning, metropolitan planning organizations and their project sponsors to develop transportation initiatives that improve air quality and reduce congestion (U.S. DOT, 2010). This program further demonstrates the government's commitment to improving health and the environment and explicitly links partnerships between local governments, transportation planners and public health professionals to healthy development.

Health Impact Assessment and the BeltLine

In 2007, a Health Impact Assessment (HIA) was conducted by the Georgia Institute of Technology's Center for Quality Growth and Regional Development with assistance from the Centers for Disease Control and Prevention (CDC). The HIA was conducted to make recommendations to ensure the integration of health to the overall design and decision-making process of the BeltLine. The HIA aimed to show how the BeltLine could affect health outcomes and provided recommendations to alleviate negative health outcomes or consequences and provide recommendations to key decision – makers. One of the recommendations of the HIA was to invite a health official to join the Atlanta BeltLine, Inc. Board (Ross, 2007). The HIA also disclosed the importance of integrating health during the planning and design process from

³ The Atlanta BeltLine is not currently utilizing any CMAQ funds.

the initial concept. This involves public health professionals working side by side with local government officials, planners, developers and community leaders from design to construction and evaluation. The HIA concludes with a “call to action,” for decision – makers, city planners and public health professions to unite, collaborate and jointly make decisions on how built environment projects can improve community health (Ross, 2007, p.178). Building from where the HIA concluded, The Atlanta BeltLine Inc., The Atlanta BeltLine Partnership, Georgia State University, Georgia Institute of Technology, Emory University, and the CDC formed the BeltLine Health Proposal Committee to develop a proposal for a multi-year health study within BeltLine communities.

Statement of Purpose

The primary purpose of this project is to develop a research proposal to study and analyze the health benefits associated with multi-use trails within BeltLine communities. A secondary purpose of this project is to evaluate the multi-sectoral and multi-institutional partnership that was formed to develop the research proposal and study the influence of the BeltLine on health outcomes. The project will include the following components:

- Justification for the health outcomes to be considered for evaluation related to multi-use trails along the BeltLine. Since the BeltLine is one of the largest and most comprehensive urban re-development projects across the nation, there is a unique opportunity to study the natural environment, the long-term influence of multi-use trails on health impacts and decision-making regarding available modes of transportation and physical activity.
- This project will document and evaluate how an interdisciplinary team was formed to create a framework for studying the impacts of the built environment on health outcomes and to prepare a health study proposal in a collaborative fashion. The BeltLine is a

comprehensive project, and the issue of health is complex. The BeltLine enables exploratory research to better understand how community development affects community health. These factors encourage research involving a multi-sectoral partnership including public health professionals, researchers, urban planners, trail design experts, nutrition and physical activity experts, economists, public policy experts and GIS specialists.

Objectives

- Objective 1: To work with an interdisciplinary team to develop a proposal (or set of proposals) that will identify, analyze and measure the health outcomes related to multi-use trails along the BeltLine.
- Objective 2: To provide background information linking the influence of multi-use trails to health outcomes (levels of physical activity, BMI, obesity), and evaluate the process of working within a multi-sectoral, multi-institutional partnership to study the influence of the built environment on health outcomes.
- Objective 3: Make recommendations that will increase the likelihood that the Beltline development efforts will positively influence health outcomes.

CHAPTER 2 – Review of Literature

The purpose of this project is to develop a proposal to conduct an initial study and analysis of the natural environment and built environment assessing how multi-use trails affect health outcomes. However, since the BeltLine is a dynamic community development project, there are other opportunities for the BeltLine to influence health including the integration of light rails and active transportation, neighborhood connectivity and social capital, green space and mental health, and proximity of local area schools to trails and green space and childhood obesity. A literature review was conducted to explore relevant research on how community development initiatives have been linked to improved health outcomes and how multi-sectoral and multi-institutional partnerships were formed to conduct research, design interventions to address health disparities and better integrate the health and the built environment.

Intersectoral and Multi- Disciplinary Partnerships Involving Public Health and the Built Environment

Partnerships that involve a variety of professions and different sectors collaborating to implement built environment projects to achieve positive health outcomes are still nascent. There are limited examples of public health officials working with city and transportation planners, developers and communities to address how changes in the built environment positively and negatively affect health. Developing multi-sectoral and interdisciplinary partnerships is relevant to understanding the components of the built environment that influence health – especially since both the built environment and health involve broad, complex and diverse sectors and interact in complex ways. When the community is included as a key stakeholder and partner, the relationship becomes even more multifaceted. As noted by Schensul et al., (2006) “in community settings, where problems are complex, single disciplines may be

unable to offer the best and most complete theoretical and methodological tools for problem identification and solution, a situation calling for interdisciplinary teamwork” (p. 80).

One example of a multi-disciplinary team including public health officials, planners, researchers, advocacy groups and the community to identify how land use influences health is the Land Use and Health Resource Team in Michigan (Bassett & Glandon, 2008). The goals of this team were to conduct research on how land use affects health, engage in health education and health promotion, and test tools that integrate health and planning (Bassett & Glandon, 2008). Another example is the interdisciplinary/intersectoral research team and partnership that was formed in Connecticut to research depression and barriers to mental health in older minority adults (Schensul et al., 2006). One of the goals of this research team was to build the necessary structures to sustain interdisciplinary/intersectoral research partnerships (Schensul et al., 2006). Schensul et al., (2006) found that the success of their research and partnership evolved once the goal of the research included the targeted communities/populations “to promote structural transformations that reduce disparities,” and when all team members shared the same problem-solving strategies and a common, shared objective (p. 79).

The Land Use and Health Resource Team in Michigan was created to respond to key findings in the health impact assessment and the Behavioral Risk Factor Surveillance System (BRFSS). This interdisciplinary team has participated in descriptive studies to learn more about how the built environment and land use in Lansing affects health. In order to test tools that integrate health and the environment and ultimately influence land use and policy decisions, the team defined three strategies: develop a geographic information system to capture land use and health data that will be readily available to planners, conduct self reported health evaluations with the community, and develop an advocacy campaign (Bassett & Glandon, 2008).

Michigan's Land Use and Health Resource Team is comprised of professionals representing different sectors collaborating to identify how land use influences health, raise awareness, and mobilize colleagues and the community to take action. The Land Use and Health Resource Team recognized the importance of involving researchers, planners, public health professionals and the community but also recognized that this group is comprised of unpaid volunteers so it can be challenging to convene all the members.

Similarly, Schensul et al., (2006) noted that potential conflicts of coordinating and establishing interdisciplinary/intersectoral research could involve a lack of consensus around the research design and methodology. Clarity around roles and responsibilities for each of the team members is equally important and should be stated early in the process (Schensul et al., 2006). The diverse team formed for this study included anthropologists, psychiatrists, senior housing managers, representatives from the Institute of Community Research, the Braceland Center for Mental Health and Aging, the Hartford Housing Authority and residents of public senior housing (Schensul et al., 2006). This group specifically excluded academic partners and Universities due to their inflexibility to address community based needs, and their drive to produce research independently (Schensul et al., 2006). Importantly Schensul et al., (2006) commented "Each partner brought something unique to the study, derived unique professional and organizational benefits from participating in it and was willing to share scarce financial resources, all factors necessary for successful interdisciplinary/intersectoral work" (p.82).

The interdisciplinary/intersectoral team in Connecticut shared a common concern – "the mental health and well being of older adults (Schensul et al., 2006, p. 82). This group was able to link their concern and study to the built environment especially since many older adults are aging in rented units or large condominium facilities in urban environments, have limited sources of

income and lack assisted-living support (Schensul et al., 2006). One of the key recommendations to better address the mental health of low-income minority adults is to develop programs that enhance “social cohesion” to limit the affects of rigid government policies surrounding subsidized housing choices (Schensul et al., 2006, p. 89). The unique suggestion from this team was to “treat buildings as communities” and transfer more authority and decision-making power to the residents to determine where they will live and how they will interact with their community and building, which is predicted to improve their mental health and overall wellbeing (Schensul et al., 2006, p. 89). The partnerships described above demonstrates how different sectors can work together to achieve a common goal.

One factor that these partnerships have in common is the inclusion of community members and the acknowledgement that communities are key stakeholders for initiatives that modify the built environment to improve health. Community partnerships help implement self-assessments to determine if interventions are achieving the expected results from the beneficiaries that are intended to receive the benefits. Additionally, community partnerships and neighborhood groups offer a unique perspective on current gaps in the infrastructure that limit access to specific services that can improve health. Including community members on planning teams is important to ensure that communities’ voices and contributions are represented when data, concerns and recommendations are shared with city officials to better leverage resources and resolve limitations related to the built environment (Bassett & Glandon, 2008).

Central to community development and multi-sectoral work is community based participatory research (CBPR). The W.K. Kellogg Foundation defines community based participatory research as “a collaborative approach to research that equitably involves all partners in the research process and recognizes the unique strengths that each brings. CBPR begins with

a research topic of importance to the community and has the aim of combining knowledge with action and achieving social change” (2001). The goal of CBPR is to approach science in a participatory manner that includes the perspective of scientists, policy analysts, community members and other stakeholders to conduct research and develop solutions together (Silka, 2010). The community based participatory research approach generates a new body of knowledge around complex issues including health and the environment and encourages the key stakeholders to take action and resolve issues that emerge from new research – the body of knowledge that is developed is therefore “co-created” by all the members that comprise that multi-sectoral research team (Silka, 2010). In addition to strengthening research, funders are also increasingly interested in this approach to research and local action. The National Science Foundation has recently awarded the University of Maine \$20 million over five years to develop the Sustainability Solutions Initiative – an interdisciplinary, community based participatory research initiative that will use evidence based data to drive decision – making and sustainable solutions in Maine (University of Maine, n.d.). When a team comprised of stakeholders from various sectors and disciplines are working together to achieve a common goal utilizing their individual skill sets, a clear strategy and process for designing the research must be established.

Conceptual Framework and Health Disparities

After a team or partnership has been formed, the next step is mapping and understanding the pathways in which the built environment affects health. To better understand how public health and other sectors like urban planning can utilize their skills and resources to collaborate and achieve a shared objective, a conceptual framework is necessary to guide the process. Factors that may influence the well-being of urban populations include social, political, economic and environmental factors, which influence health outcomes at different levels

including the individual, household and community (Schulz & Northridge, 2004). Conceptual models serve as a reference and guide partners to design interventions that address factors influencing the built environment and health – both of which are complex and multifaceted. Schulz and Northridge (2004) developed a conceptual framework aimed at highlighting the social determinants of health from the lens of public health education and promotion and urban planning (Figure 3).

The conceptual framework exemplified in Figure 3 is one approach to connect health outcomes to the physical element and the pathways, which influence behavior. Conceptual frameworks map out the physical and behavioral elements that influence individuals, households, communities and populations and aim to link health outcomes and behavior to the physical environment, natural environment and social support networks (Schulz & Northridge, 2004). In this diagram, the built environment is situated within the community domain and is defined as man-made features such as public transit systems, buildings, and public services (i.e. parks) that influence accessibility and affordability of services that improve individual health and influence individuals' perception of the built environments. It is important to build conceptual frameworks early in the research design process to discuss all the pathways and complex linkages between the environment, individual behavior and community health outcomes in order to design the study and then support research findings with appropriate interventions and solutions.

The structure, location and access of built environments are related to health outcomes. Studies have recently explored the specific health disparities associated with the built environment and specific health outcomes such as obesity rates. Gordon-Larsen et al., (2006), examined the location and accessibility of physical activity facilities (i.e. YMCA, parks and gyms) to determine how the built environment contributes to physical activity levels and obesity

rates for large populations. This research found that individuals with higher socio-economic status (SES) were more likely to have access to at least one facility to engage in physical activity compared with individuals in lower-SES groups and individuals in minority-based communities (Gordon-Larsen et al., 2006). Neighborhoods with a higher number of physical activity facilities were linked to lower rates of overweight individuals and a higher likelihood of individuals engaging in moderate-to-vigorous physical activity (Gordon-Larsen et al., 2006). These key findings are important for the initial research proposed along the BeltLine especially since the 33 miles of multi-use trails will intersect more than 46 diverse communities. Extra efforts need to ensure that minority-based communities and communities with lower-SES have the same opportunities to engage in physical activity as higher SES communities, which may reduce the risk of being overweight and/or obese and decrease at least one health disparity linked to the built environment. Other inequalities that should be explored with respect to access to and utilization of services that can improve health are related to ethnicity, age, gender and social class (Schulz & Northridge, 2004).

As previously discussed, community based participatory research (CBPR) is gaining popularity as an “alternative research paradigm, which integrates education and social action to improve health and reduce health disparities” (Wallerstein & Duran, 2006, p.312). However, once health disparities have been identified by the unique collaboration between community members and academic partners, the formation of an action plan, responsibilities for resolving the health issues, and responsibilities for identifying the necessary resources all must be discussed and agreed upon by the group members. An underlying question that is still being explored is the role of research throughout the social change process during the research design and in developing interventions to address the key findings that may reveal a number of health

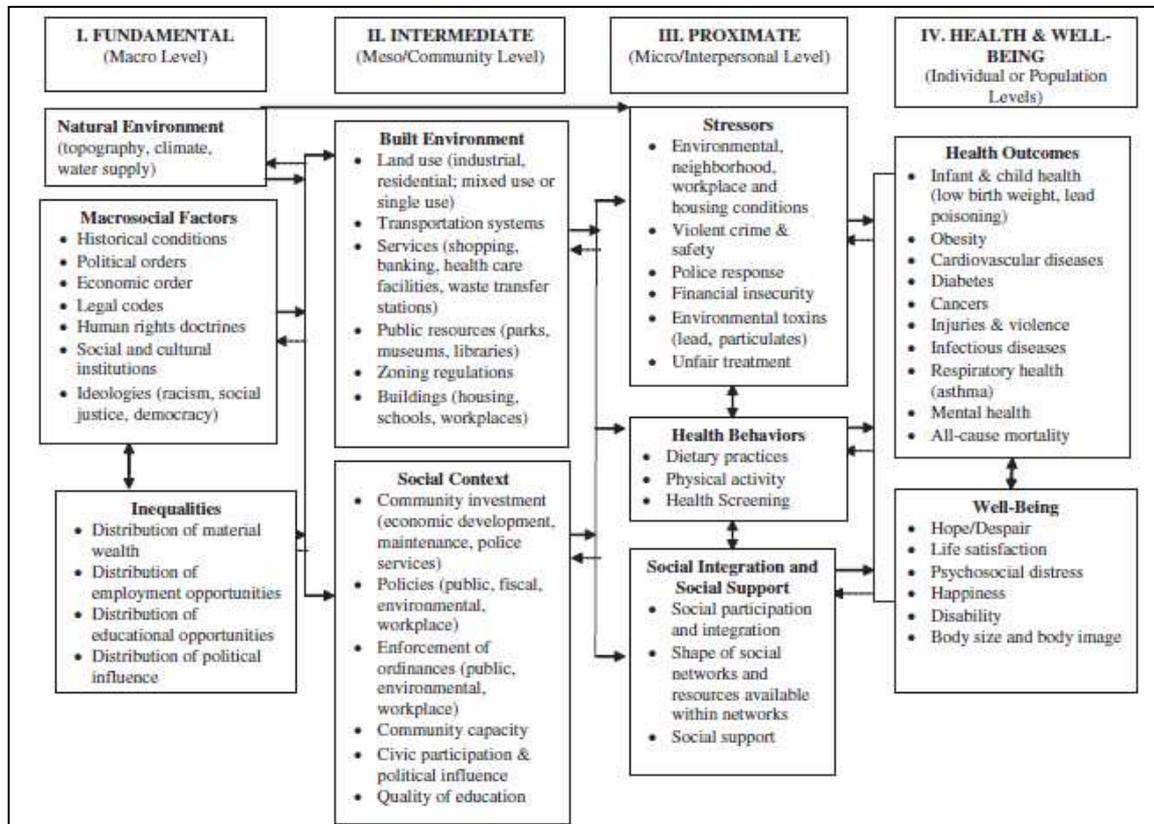
disparities (Wallerstein & Duran, 2006). A stronger evidence based needs to be built and documented to demonstrate that CBPR helps reduce health disparities. In order to develop mutual trust and ensure that there is a shared ownership and common goal over the research and action plan post research the key stakeholders (i.e. academic partners and community members) must discuss the research agenda and any gaps including lack of interest from either of partners moving forward (Wallerstein & Duran, 2006). The research agenda should be of interest to all parties, clearly define community benefits and be designed in a way that the research process including data collection, analysis and dissemination of information can be “shifted” to the community over time (Wallerstein & Duran, 2006). Building the capacity of the community to develop the necessary skills sets to identify health disparities and then develop and implement action plans to reduce disparities is instrumental to long-term sustainability and success. Most importantly, the long-term output of CBPR and academic and community-based partnerships should contribute to reduction in health disparities and social change.

There are limited examples of how CBPR has been utilized to reduce health disparities and contribute to lasting social change. Below are two examples of how CBPR has influenced health outcomes. One of the earliest studies that documented the value added of community participation on improved health outcomes was demonstrated in a 1990 study conducted in Togo and Indonesia (Eng et al., 1990). This research found that 25 – 30% more children were immunized in the communities who participated in water projects to ensure improved water quality and increased supply of water compared to other villages where community members were not engaged in water projects (Eng et al., 1990). Another example is the use of coalitions and strategic partnerships to collaboratively design conceptual frameworks and change indicators that reflect improvement in health outcomes over time. Fawcett et al., (1995) documented the

success of a specific coalition comprised of members of the Kansas Health Foundation, three Kansas communities and Project Freedom of Wichita to reduce adolescent substance abuse. A key output of this coalition was to build capacity and empower the community to be a part of the change process. This coalition established a peer support program and worked with designated “agents of change” (i.e. teachers and peers) to develop and implement solutions to reduce substance abuse by adolescents (Fawcett et al., 2005, p. 688). This is an example of an early process that was used to mobilize and empower key community members to collectively take action and address a health issue.

Each partnership and team will need to modify and adapt their own conceptual framework to address the stressors, factors and pathways given the social and environmental context of their issue. Depending on the ultimate goal of the partnership or intervention, the group may choose to focus on one specific pathway. If the goal is to have the greatest impact or influence on the population’s health then the focus will shift to interventions that address zoning, land use, and policy, which encourages the collaboration between urban planners and public health professionals (Northridge et al., 2003). In addition to building partnerships and aligning public health goals with designing healthy cities, it is important to understand how individuals grow, change and react to their built environment.

Figure 3: Social Determinants of Health and Environmental Health Promotion



Source: Schulz & Northridge, 2004

Multi-Use Trails and Physical Activity

The built environment plays an important role in increasing access to physical activity, especially for neighborhoods with well designed pedestrian infrastructure (Fitzhugh et al., 2010). Trail development is cost effective and provides equitable alternatives for individuals engaging in physical activity evident by the increasing utilization of trails for walking, cycling and other outdoor activities (Toped et al., 2006). Trail development is related to sustaining the levels of physical activity for active individuals, increasing the levels of physical activity for non active individuals and is an important factor determining where individuals choose to reside (Brownson et al., 2004; Gordon et al., 2004; Librett, John J., 2006).

A growing body of literature and evidence links the use of trails and public spaces to increased levels of physical activity and improved health outcomes. Individuals who use public open spaces (i.e. parks and green space) are almost three times as likely to meet the recommended physical activity levels compared to individuals who do not use public open spaces (Giles-Corti et al., 2005). Increased access to vast public spaces is related to higher levels of walking activity (Giles-Corti et al., 2005). Individuals who reported using trails for exercise and health reasons reported using trails more than individuals who cited other reasons for primary trail use (i.e. socializing and dog walking) (Dunton et al., 2009). Individuals who use trails at least one time during the week were two times as likely to meet the recommended physical activity requirements compared with individuals who rarely or never use trails (Librett, et al., 2006).

Access to and use of parks is also linked to active lifestyles and higher rates of physical activity. Local park users residing less than one mile from parks in Atlanta were four times more likely to use the park at least once, weekly and engaged in more physical activity compared to non local park users (Rutt et al., n.d.). In contrast individuals in DeKalb County, Atlanta who are African American and live farther than one mile from a park were more likely to lead sedentary lifestyles (Rutt et al., n.d.). Trail users in a park setting are more likely to engage in moderate-to-vigorous physical activity (Biazzo et al., n.d.). While trail use can influence physical activity, it is important to consider trail features and maintenance. Trails that are paved, included proper signage and are connected to neighborhoods experience higher utilization rates (Biazzo et al., n.d.). In sum, physical activity levels are higher for individuals living within a one-mile buffer of urban trails who use the trails compared to individuals who do not use trails even though they live within a reasonable distance to access the trails (Spruijt-Metz et al., 2010).

To better understand the influence of trails on individual behavior and perception, different research methods should be employed that measure behavior change and the physical components of the built environment. A variety of tools can be utilized that collect data on self-reported measures including perceptions of the environment (i.e. mail or phone surveys), direct observations utilizing environmental audits, and incorporating GIS (Brownson et al., 2009).

Active Transportation

Active living and active transportation are increasingly being integrated into community design and development. Active living refers to a “way of life that integrates physical activity into the daily routine, and is an important aspect of preventing obesity among children and families” (Robert Wood Johnson Foundation, 2010). There are many ways in which individuals can include physical activity in their daily lives such as cycling and walking to work or taking the stairs rather than the elevator. Since the BeltLine is developing over 33 miles of multi-use trails it is predicted that this will encourage both adults and children to engage in more physical activity for recreational purposes but also as a form of active transportation. The section below highlights relevant literature supporting active transportation as a way to meet recommended physical activity requirements and improve health.

Active Commuting to School

As obesity rates continue to climb for adults, obesity rates are also increasing in children. Obesity rates for children between the ages of 6 – 11 quadrupled over the past 40 years (Ogden et al., 2008). The Centers for Disease Control and Prevention recommends that children engage in at least 60 minutes of moderate-to-vigorous physical activity daily but studies reveal that less than half the children in the U.S. meet these recommendations (Active Living Research, 2009). Children who engage in physical activity at an early age might not be as susceptible to chronic

diseases as an adult (Biddle et al., 2004). Multi-use trails can engage children in higher levels of physical activity and serve as a mode of transportation for children to get to school (Davison et al., 2008). Additionally, children who actively commute to school have higher physical activity rates compared to children who travel to school by other modes of transportation (Cooper et al., 2003; Alexander et al., 2005).

Perceived and actual risks or barriers to active commuting to school include safety from fast moving traffic and crime (Collins & Kearns, 2001). A few important predictors associated with active commuting to school include parents who are connected with the community (know their neighbors) and safety measures such as lighting and cross walks (Hume et al., 2009).

Active Commuting to Work

Active commuters are individuals who bike, walk or ride transit to work. Active commuting to work could lead to regular walking and bicycling trips for recreational purposes (or physical activity) and help prevent the onset of chronic conditions if the level of physical activity of these trips meets the recommended guidelines (Merom et al., 2008). Of individuals who utilize public transit, 29% met the recommended physical activity requirements for adults and on average transit users walked for about 19 minutes to and from their mode of public transit (Besser and Dannenberg, 2005). This data suggest that individuals who take public transportation might have the opportunity to engage in physical activity that brings them one step closer to meeting the recommended amount of daily physical activity. It is important to note that in 2008, 25% of adults nationwide reported they did not engage in leisure-time physical activity (CDC, 2010). In Georgia, about 27% of adults did not engage in leisure-time physical activity (CDC, 2010). While so many adults struggle to meet the recommended physical activity requirements, utilizing public transit could be one quick solution to help adults engage in some

physical activity on their way to work or other activities. Additional benefits of active commuting were demonstrated by the CARDIA study that found men who engaged in active commuting had improved fitness levels, reduced blood pressure and insulin levels, and reduce the risk of obesity (Gordon-Larsen et al., 2009). Active commuting, including walking to and from public transit, has the potential to engage individuals in physical activity and achieve the recommended amounts of daily physical activity.

Barriers to and predictors of trail use

While it is important to understand why and how individuals utilize multi-use trails, it is also relevant to understand some of the barriers that inhibit utilization of trails. Some barriers that may influence or prohibit trail use include safety, access, upkeep and crowding (Gordon, Paul M., 2004). Other factors that may influence trail utilization based on studies evaluating uses of public spaces in general include the amount and quality of available space, characteristics of other users (i.e. socioeconomic status, age, gender, ethnicity), personal preference, attitudes and perceptions, and the specific attributes of the trail or public space that meet the needs of the users (Giles-Corti et al., 2005). Trail use is also linked to the built features of the trail and trail location including connectivity, adjacent vegetation, access to facilities, and the presence of road traffic (Reynolds et al., 2007). Trail use was found to be positively influenced with the presence of both urban and natural views, trail upkeep, and the presence of facilities (Reynolds et al., 2007). One feature of the built environment that was found to contribute to and predict greater levels of physical activity is neighborhood connectivity (Biazzo et al., n.d.). Neighborhood connectivity is an important predictor and measure of the built environment's capacity to sustain physical activity but also as a mechanism to link individuals to other locations where they can

continue to engage in physical activity (i.e. trails and parks) or other important destinations including their residency, shops or place of employment (Biazzo et al., n.d.).

In sum, the built environment is a major influence on some of the Nation's most pressing health concerns, including inactivity, obesity, and overall wellbeing. However, addressing improvements to the built environment that can influence health outcomes will benefit from ongoing and solid partnerships between academic institutions, state development agencies, local governments and non-profit organizations. The partnership should be multi-sectoral to ensure a holistic approach to develop built environments that factor in the whole community and future growth of communities encouraging healthy food environments, job opportunities, access to green spaces and open public spaces, and mobility. Active living by design is a concept promoted by the Robert Wood Johnson Foundation that strives to create a "culture" of engaging in physical activity during daily life and collaborating with local agencies and organizations that can work with communities to develop the built environment in a way that enables a more active lifestyle (RWJF, 2010). The BeltLine is incorporating the active living by design model and is re-designing many parts of Atlanta. The integration of an improved built environment into the community has the potential for positive change in the way individuals commute, engage in physical activity and perceive their community.

CHAPTER 3 – Procedures

Kevin Burke, Senior Landscape Architect with the Atlanta BeltLine Inc., attended the Conference on New Urbanism in May 2010 in Atlanta, Georgia (C. Rutt, personal communication, March 2011, <http://www.cnu.org/>). At the conference, Mr. Burke attended a presentation by Dr. Candace Rutt with the CDC on her research regarding neighborhood parks and physical activity. Mr. Burke and Dr. Rutt convened a group of interested colleagues and peers to discuss the potential of studying the affect of the BeltLine on health outcomes, which later developed into the BeltLine Health Proposal Committee. Members of the BeltLine Health Proposal Committee formed in early August, 2010 to discuss a potential collaboration to study how BeltLine projects like the development of multi-use trails affect health outcomes. Committee members include researchers, city planners, public health professionals, university faculty, GIS experts, a statistician, a public policy analyst, and a landscape architect. The BeltLine Health Proposal Committee includes representatives from the Centers for Disease Control and Prevention (CDC), Emory University, Georgia Institute of Technology, Georgia State University, Atlanta BeltLine Inc. and the Atlanta BeltLine Partnership (Figure 4).

Figure 4: Diagram of the Members of the BeltLine Health Proposal Committee



The committee met regularly over the period between August - December 2010 and produced some initial deliverables. Those included a draft literature review on physical activity levels and multi-use trails and active living, an initial concept note, and an analysis of potential funding opportunities and donors who might be interested in funding health research. (Refer to Appendix B for the fundraising matrix that was developed, which provided a snapshot of the fundraising landscape that were relevant to the research goals.) In addition, Brooke Barnes in collaboration with a colleague from the CQGRD who was also a member of the BeltLine Health

Proposal Committee drafted a multi-year strategy that identified six core research domains, four cross-cutting themes and the key research questions for each domain (see Appendix E) (M. Marcus, personal communication, April 6, 2010).

After the committee had met for three months, an initial survey was developed to evaluate the partnership. The first survey was administered in November 2010. Survey Monkey⁴, online survey tool, was used to deliver the survey and obtain data from members of the committee. The initial survey evaluated the purpose and structure of the committee, the clarity of the roles and responsibilities, and the initial challenges and barriers for this committee and proposed study. Findings from these questions could then inform how meetings are structured and what barriers and challenges need attention before finalizing a proposal. The initial survey included the following questions, which were developed specifically for this evaluation.

1. What motivated you to join this committee/partnership?
2. Do you think the group used a fair and rationale process to determine a shared objective/goal for this study?
3. What do you feel are some limitations for the current structure, roles and responsibilities of the committee/partnership?
4. Do you have any recommendations for future multi-sectoral, multi-institutional partnerships that are analyzing the intersection between the built environment and health?
5. What do you think is working or has worked?
6. What do you think has not worked in terms of the partnership?

The survey questions were developed in order to explore if the group was communicating properly and to determine if the purpose of this committee was clear. This evaluation also explored why these individuals were interested in collaborating on this research and how the

⁴ Survey Monkey is a free online survey and questionnaire software. <http://www.surveymonkey.com/>

committee members felt about working in partnership with other local agencies and organizations.

In March 2011, the second and final survey was administered to evaluate the committee later on in the process and determine if any perceptions had changed during time. The second survey was also administered using the Survey Monkey online survey tool. Respondents were emailed a link directing them to an online survey where they could enter in short responses to the following questions.

1. What motivated you to join this committee/partnership?
2. Is this committee an effective resource, body and/or mechanism to integrate health into the built environment? Why or why not?
3. What do you think should be the primary role and structure of this multi-sectoral, multi-institutional partnership, which we have been calling the BeltLine Health Proposal Committee?
4. Do you have any recommendations for future multi-sectoral, multi-institutional partnerships that are looking at the intersection between the built environment and health?
5. Please share any additional concerns about the current committee/partnership? What specifically about this partnership functions well? What specifically about this partnership is not working so well?

Questions 1, 4 and 5 were asked during the initial survey and were repeated during the final evaluation, enabling respondents to reconsider their response. It also allowed respondents who did not complete the first evaluation and new committee members to provide feedback. The answers to the questions were analyzed using content analysis and grouped together under each question. Since the survey responses were low (between 3 – 5 responses for each question) each

response was read and summarized. Since the objective of this survey was to obtain answers to the structured questions, the content was not analyzed for emerging themes. Most of the responses were consistent and wherever a different response or potential outlier was found, that response was isolated and preserved as a direct quotation. Wherever appropriate, direct quotations were used to convey a specific point or concern from the respondents. Finally the responses were compared to other comments and suggestions made by members of other coalitions whereby many of the same challenges, strengths and limitations were observed. The responses to these questions were used to generate a series of recommendations for this partnership. The response rate was low because many committee members were already volunteering so much of their time to participate in committee meetings and action items that resulted from the meetings that it was challenging to generate interest to complete the surveys. In addition, many members were new to the group when the surveys were administered and indicated they had not participated in enough committee meetings to be able to respond to the surveys.

CHAPTER 4: Findings

Interdisciplinary Research and Multi-Institutional Partnerships Focusing on Community Based Participatory Research

In order to research and resolve complex health issues such as obesity and the influence of the built environment on physical activity levels, multi-sectoral and multi-institutional partnerships need to be established. In addition to an interdisciplinary approach, partnerships should also incorporate a community based participatory research (CBPR) methodology. CBPR is becoming more widely used and appealing to funders. The University of Washington in Seattle is so dedicated to cultivating partnerships that embrace CBPR that they have established their own non-profit organization, Community-Campus Partnerships for Health (CCPH) that is dually committed to re-shaping communities and higher education (2011). CCPH's goals include building partnerships with academics and community members to research and solve social, health and economic problems, support community development and engage in community based participatory research that leads to social change (2011).

Another example of an interdisciplinary and community based approach to tackling leading public health issues is California's Partnership for the Public's Health (PPH). PPH is part of California's Public Health Institute, which received \$37 million from The California Endowment over a six year period to develop grants and cultivate partnerships between public health agencies and communities in California (Casey et al., 2007). To manage the grant-making process and the partnerships that were being developed, PPH developed a Program Office. The Program Office served as the central hub for this initiative to effectively and efficiently manage grants, evaluate programs, streamline communication, provide general program management and oversight, and developed plans to disseminate key findings (Casey et al., 2007). PPH's primary

goal was to develop long-term partnerships between local public health agencies and communities to jointly identify urgent public health issues and resolve them together. At the conclusion of the six-year initiative, PPH had established 39 partnerships between 14 public health departments and 39 community groups in California (Casey et al., 2007, p. 3).

The two examples above demonstrate the growing interest to build sustainable, interdisciplinary partnerships that are community-centered to address public health issues. The second component of this project was to evaluate the BeltLine Health Proposal Committee that was formed to develop an initial proposal to study the influence of the BeltLine on health outcomes. The following section summarizes the responses from two surveys that were administered during the process to evaluate the effectiveness of the committee and to determine what components of the partnership were working well and what challenges needed attention in order to move forward and develop a multi-year research proposal.

Initial survey (N = 5, Total response rate 83%)

A short survey was distributed in November, 2010 using the Survey Monkey online tool to assess and evaluate the working partnership established by the BeltLine Health Proposal Committee to determine if roles, responsibilities, and objectives were clearly defined and equitably distributed. Five members responded to the initial survey (between August – December, 2010 there were only 6 active committee members).

Motivation to join this committee/partnership (5 responses)

Two respondents indicated they were motivated to join this committee because they were interested in the topic area and intersection between the BeltLine and health. One committee member was interested in joining this committee with the hope of better understanding the types of people that utilize multi-use trails and why and what can be done to increase trail utilization

and improve health outcomes. Another committee member was interested in using his/her background in planning and recent experience in health to better understand multiple and long lasting influences of the BeltLine on health outcomes, mixed land use and transit. One respondent recognized the importance and value added of the BeltLine for the Atlanta community, in particular, its influence on health promotion, which provided a unique opportunity to explore the influence of the built environment on health.

Clear process to determine shared objective for this study (5 responses)

The five committee members agreed that the process employed to date was fair and rationale and that common goals and objectives were being discussed. One committee member indicated that thoughtful and thorough discussions led to a group consensus around decisions and issues. Two respondents indicated the process had been fair and rationale to date, but recognized the objectives of the study were still being developed.

Limitations regarding structure, roles and responsibilities (5 responses)

Some of the limitations regarding the structure of the partnership and the designation of roles and responsibilities included difficulty organizing and attending meetings and that clear leadership had not been determined. Another respondent indicated that the committee was still exploring the different strengths, interests and skills or capabilities of the group. The same respondent indicated one limitation was that the group met infrequently so the learning curve was slow and the process of building trust slowly developed.

Recommendations for future multi-sectoral, multi-institutional partnerships (2 responses)

Some suggestions for future multi-sectoral and multi-institutional partnerships included clear communication from the initial development of a working group/committee. One committee member responded that a SWOT (strength, weakness, opportunity, and threat)

analysis for each participating organization might be beneficial. Another team member commented on how it might be more efficient to accelerate the process but this respondent also recognized that this might not be feasible given the size of the group and magnitude of the study.

Other comments and concerns (3 responses)

Additional comments about the partnership and unique key stakeholders involved in this study included the recognition that leadership must be identified prior to submitting any proposals and that leadership is vital to sustaining momentum and creating stability. The same respondent indicated that it would be necessary to hire additional staff and build capacity in order to implement the proposed activities. One other team member commented that this committee appeared to be a unique arrangement for all members but hoped that this partnership and collaboration could serve as a model for future studies and partnerships. One respondent was concerned how the group would handle setbacks or delays in achieving goals and balancing this with being sustainable as a group. This same respondent indicated one factor that was working for this group was the wealth of knowledge the committee members brought and how committed each member is. Yet this same respondent indicated that one factor which was not working for the group was the fact that committee members were also committed to their current projects/work which limits the time they are able to dedicate to this project.

Final survey (N = 4, Response rate 57%)

A final survey was distributed in March 2011. The final survey was distributed to 7 members for their thoughts and feedback. Four members responded to the final survey. Some of the reasons accounting for the response rate included the difficulty in generating interest to complete surveys, as committee members were already volunteering significant amounts of their time to the committee, many members were new to the group, and some did not feel they had

participated long enough to be able to provide input to the surveys. Even though the group had expanded and included up to 14 members, many had only attended 1 or 2 meetings so they might not have had enough experience with the group to provide input and feedback yet.

Motivation to join this committee/partnership (4 responses)

Two respondents reiterated their interest in the BeltLine and one specifically mentioned an interest to better understand the “health impacts of such infrastructure.” One respondent indicated joining this committee was linked to an “expectation” related to his/her job. One respondent detailed his/her interest in improving community health and to “maximize the returns on a potentially-health promoting public project” while simultaneously participating in an evaluation that could inform future health promotion initiatives and research.

Is this committee an effective body/mechanism to integrate health into the built environment (4 responses)

The responses to this question varied. One respondent felt that it was too early to determine if this committee was an effective mechanism to integrate health and the built environment. Similarly, another respondent indicated that the group was just now “starting to be effective” but that many issues still need resolution and that some people were not on the same page. Another respondent indicated that there were too many challenges related to unclear leadership and lack of deadlines to determine how effective this group was. The same respondent indicated that another challenge was the competing institutional priorities, varying ongoing BeltLine projects and limitless ideas for proposal development all of which is being prioritized differently by the leadership and other external agencies. One respondent enthusiastically indicated that this group was effective. This same respondent believed this group to be an effective mechanism to integrate health and the built environment since the group is comprised

of “top researchers from almost all of the major universities in Atlanta and CDC” and had additional support from the BeltLine Inc.

Primary role of this committee (4 responses)

Two respondents indicated the primary role of this committee should be to secure funding. One respondent felt that securing funding would support research and health promotion efforts and the other felt funding could support the BeltLine in general as it continues to be developed. One respondent indicated that the purpose of this committee is to “capitalize on the unique areas of expertise” of the participating institutions to study the BeltLine and potentially make recommendations to improve future developments. This same respondent believes another role this committee should play is to “demonstrate how ongoing health evaluation can and should be a part of public/policy projects.” Lastly, one respondent commented that in addition to securing funding, GSU should be the lead and the other institutions and partners could act as “consultants.”

Recommendations for future multi-sectoral, multi-institutional partnerships (4 responses)

One respondent indicated that it was important to identify a person from the beginning who would coordinate meetings, activities, notes and other logistics. One respondent said it was important to “define your primary and secondary partnerships” before developing a proposal and engaging in strategic planning. Another respondent indicated it would be helpful to have a “skills assessment method” which can help divide and delegate tasks quickly and more efficiently. This same respondent also recommended that an “inter-institutional memorandum of understanding” should be signed at the beginning so roles and responsibilities are clear to everyone in the group. Lastly, a respondent recommended that all members are “at the table” from the beginning.

Furthermore, this respondent commented that it was “unfortunate that the BeltLine Partnership and BeltLine INC were not talking to each other about their respective activities.”

Additional concerns/comments. What’s working? What’s not working? (3 responses)

One respondent indicated that there are a lot of academic organizations vested in this group and the situation is “politically charged,” therefore communication and “equal division of resources/efforts could improve the situation.” One respondent commented that there was a lot of mutual respect amongst members of the group and that she/he personally likes everyone who is involved however there is some fear that there is a lack of communication and that one organization in particular might be more competitive and unwilling to collaborate.

Discussion

After a careful analysis of the responses, a few modifications were made to address some of the concerns and limitations. First, an online community of practice, Huddle⁵, was formed to store all important committee documents, upload notes, and post discussions and other relevant resources. To date, 9 members of the committee have joined the Huddle site, three members have posted documents and one member started a discussion. Face-to-face meetings are held monthly for about 2 – 3 hours, which accommodated the majority of the group so the frequency and duration of the meetings have not changed. The committee organizers have also arranged 1-hour phone calls for quick updates to discuss necessary or urgent decisions or action items instead of prolonging the discussion for the next monthly, face-to-face meeting. Shortly after the initial survey, a lead member, Georgia State University, was recommended based on the consensus of the committee. However, it is important to note that while this committee recommended that GSU serve as the lead, this recommendation was not shared or vetted with the leadership teams of the Atlanta BeltLine Inc., and Atlanta BeltLine Partnership.

⁵ Huddle is an online project management and collaboration software. <http://www.huddle.com/>

Coordinating meeting times and organizing the group proved to be a great challenge.

New members were continually added to the group. Individual schedule changes were frequent, because faculty members' teaching schedules vary each semester.

Current Status

Seven months following the formation of the committee, there is an acting lead member. A

number of key deliverables have been generated, including the following:

- funders have been identified,
- a conceptual framework and timeframe have been drafted,
- a multi-year strategy has been drafted, and
- a concept note and literature review has been drafted.

However, work remains to be done to achieve the committee's objective of developing a proposal for a health study. The group has not completed the proposal partly due to infrequent meetings, long decision making and discussion processes to share interests and opportunities, and the addition of new members.

CHAPTER 5 – Summary

This project yielded two important deliverables: a proposal for an initial study of the affect of multi-use trails along the BeltLine on health and an evaluation of a multi-sectoral and multi-institutional partnership to engage in research and integrate health and the built environment. An analysis of leading health and environmental indicators including physical activity levels, obesity rates, and air pollution supported the justification and importance of engaging in research to determine how community development can positively influence health outcomes. Additionally, research and an evaluation was conducted to determine if multi-sectoral and multi-institutional partnerships could serve as an effective and efficient model to better integrate health and the built environment. It has been demonstrated that several other public health agencies, universities and organizations are developing initiatives incorporating community based participatory research methods and sustainable long-term interdisciplinary partnerships to conduct research and develop actions plans to resolve leading health issues.

Community-based participatory research and the formation of interdisciplinary coalitions are becoming the new model for conducting research, identifying health disparities and resolving health issues. There is evidence to demonstrate that coalitions and partnerships between academic institutions and communities strengthen health programs, ensure that programs are sustainable and promote equitable access to services (Wallerstein & Duran, 2006). Increasingly partnerships and coalitions are receiving funding to build long-term, sustainable solutions alongside community counterparts. For example, the University of Maine received \$20 million to develop the Sustainability Solutions Initiative – an interdisciplinary, community based participatory research initiative that builds an evidence based to drive decision – making and sustainable solutions in Maine (University of Maine, n.d.). Another example of an

interdisciplinary and community based approach that was formed to address leading public health issues is California's Partnership for the Public's Health (PPH). PPH received \$37 million to nurture and sustain partnerships between public health agencies and communities in California (Casey et al., 2007). While the formation of coalitions are more commonly formed to research health issues and disparities evidence is still emerging to demonstrate the value added of coalitions to jointly resolve health disparities and improve health outcomes in addition to generating new knowledge and conducting research.

A coalition's success and longevity is largely determined by the strength and support of its members and collective action (Raynor, n.d.). Successful partnerships and coalitions will jointly agree on several elements of a working relationship including: collaboration, commitment (i.e. time), clear understanding of roles, responsibilities and mutual benefits, shared resources, a common goal, and the recognition that new partnerships and financial resources will be leveraged to ensure sustainability of future endeavors (Raynor, n.d.; Bassett & Glandon, 2008; Schensul et al., 2006). Coalitions and partnerships that operate as a united body and embrace the characteristics aforementioned achieve great success in identifying health disparities and empowering communities to take action and get involved.

Partnerships and coalitions have the potential to conduct research and incorporate key findings into policies and strategic interventions that improve community health outcomes. The Federal Collaboration on Health Disparities Research (FCHDR), formed in 2006, is committed to tackling the underlying causes of health disparities through partnerships and collaboration with numerous federal agencies and departments to develop a "transdisciplinary, systems thinking approach to addressing the complex issues that limit individual agency efforts to reduce and ultimately eliminate health disparities (Rashid et al., 2009, p.1956). Currently the FCHDR

has prioritized the built environment as a key element to address and resolve health disparities and has identified key stakeholders, partners and interest groups to generate policies and best practices based on key findings (Hutch et al., 2011). While the FCHDR is committed to interdisciplinary research that influences policies and ensuring equitable access to health services, this coalition does not currently collaborate with the community or develop strategies to address health disparities. However, this collaborative, multi-sectoral approach to research health disparities, the built environment, and influences on health outcomes demonstrate the relevance of this topic and the importance of an interdisciplinary approach to link health and community development.

Research and advances in development including “smart growth” predict that access to affordable housing, public transit and a combination of public and private support will lead to healthy, equitable and safe communities (Hutch et al., 2011). Some evidence has been generated to show that smart growth initiatives that result in communities that are pedestrian friendly and provide access to public transportation can improve local air quality, while structural improvements to streets have been shown to calm traffic and limit automobile injuries (Funders’ Network for Smart Growth and Livable Communities, 2003). Limited evidence has been generated to support the influence of the built environment on health outcomes such as physical activity and recreation as well as the disparities that limit access. For example, studies have shown that lower-income and disadvantaged communities lack the quantity of well-maintained parks and facilities to engage in physical activity and recreation (Kacynski & Henderson, 2008). Additional data is necessary to support these predictions and close the gap between the built environment and health outcomes.

The Atlanta BeltLine presents a unique opportunity for a multi-sectoral and multi-institutional partnership to engage in research and study the influence of the BeltLine on select health outcomes. This project demonstrates that there is potential for the BeltLine to affect physical activity through the development of multi-use trails and access to green spaces. The BeltLine can also improve neighborhood connectivity by linking 46 neighborhoods to new resources and engage with the community and the city in a new way.

The health study community has created a foundation for interdisciplinary and multi-institutional partnerships catalyzed by the increasing investment and current commitment the BeltLine has to improve health. It continues to operate as a collaboration aimed at developing health study proposals, but there are several immediate challenges that need to be addressed. First, clear leadership needs to be defined and agreed upon by all committee members and the leadership of the Atlanta BeltLine Inc., and the Atlanta BeltLine Partnership. Second, roles and responsibilities need to be defined and agreed upon by all committee members including who develops and submits proposal, which institution receives the funding, and which institutions will serve as consultants or sub-grantees. Third, a clear path and process needs to be defined to support the transition of this group into a Health Advisory Group.

I believe this committee is well positioned, capable and motivated to be transformed to serve as a Health Advisory Group (HAG) for the BeltLine. The HAG can serve to ensure that health studies are reviewed, implemented and evaluated and that information is disseminated to key stakeholders including the community. Furthermore, the HAG can serve as a model of how different sectors and institutions collaborate to integrate health into the process of improving the built environment on a community-wide scale.

In the development of the HAG, it should be clear who can participate in the Health Advisory Group, what is expected of members of this group in terms of level of effort and responsibility and the length of members' terms. The Health Advisory Group will likely be comprised exclusively of volunteers from select organizations. Individuals can be recommended or nominated by the Atlanta BeltLine Inc. and Atlanta BeltLine Partnership leadership, or individuals can apply to be a member of this group. Memorandums of Agreement should be signed with organizations. This will ensure that members fulfill their commitments and obligations, not in the ad-hoc mode currently employed. The formality of signed agreements will help to ensure that the HAG has the necessary resources to meet regularly, contribute to research proposals, conduct research, leverage funding and disseminate key health findings. The Atlanta BeltLine initiative has already been hailed one of the largest and most ambitious redevelopment plans in the nation. It is very important that this initiative be served by a well organized, multi-sectoral, multi-institutional body that can measure and communicate the lasting influence of the BeltLine on improved health outcomes for current and future Georgia residents.

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Appendix A: Proposal Template

Title: Exploring the health impact of multi-use trails along the BeltLine

Introduction:

The Atlanta BeltLine is a groundbreaking and innovative redevelopment project re-shaping Atlanta residents' access to, multi-use trails, public parks, public transportation, housing and employment opportunities. The Atlanta BeltLine, projected at a total cost estimated to be \$2.8 billion, is revitalizing a 22-mile stretch of unused or under-utilized railroad corridor encircling downtown Atlanta. This project is hailed as the largest and most comprehensive development initiative ever undertaken in the City of Atlanta. An interdisciplinary team of public health professionals, urban planners, academics and trail design experts are working together to conduct a unique health study on the impacts of an extensive trail network spanning more than 33 miles and connecting over 46 diverse communities in Atlanta.

The Atlanta BeltLine is creating a distinctive framework and approach catalyzing new urban design and planning aligning components of land use, transportation and green space to create a sustainable development plan for the future growth in the City of Atlanta. By 2030, it is predicted that an additional 294,000 people will reside in Atlanta⁶. The Atlanta BeltLine aims to reverse the trend of regional urban sprawl by connecting communities and neighborhoods to trails, parks, public transportation, and enhancing the overall quality of life for Atlanta residents.

Health Issues in Georgia

At the core of the BeltLine project is an effort to increase the use of the multi-use trails to increase access to physical activity and, mitigate traffic congestion by improving access to and utilization of public transportation. The prevalence of obesity for adults in Georgia is 27%, which is just slightly below the national prevalence of obesity for U.S. adults, which is 33%⁷. Obese adults are at greater risk for other health issues and diseases including but not limited to coronary heart disease, type 2 diabetes, cancer, high blood pressure, and osteoarthritis⁸. Obesity rates are also an important indicator for health disparities and inequities in accessing health care, healthy foods, and public spaces to engage in physical activity. According to 2009 data from the Behavioral Risk Factor Surveillance System, African Americans were 51% more likely to report obesity, and Hispanics were 21% more likely to report obesity than non-Hispanic white individuals.⁹ Addressing health disparities such as equitable access to and utilization of multi-use trails to engage in physical activity is a cross-cutting theme central to this research and ensuring the success of the BeltLine to connect diverse communities and improve community health.

Another important link between the BeltLine and health is the development of a light-rail public transit system to offer an alternative to driving alone on Atlanta's crowded streets. Atlanta

⁶ Atlanta Regional Commission. Plan 2040 Forecasts. Retrieved from <http://www.atlantaregional.com/info-center/arc-region/plan-2040-forecasts/plan-2040-forecasts>

⁷ CDC 2011, 2010

⁸ *ibid*

⁹ *ibid*

currently ranks third in the entire nation for the highest traffic congestion. A 2009 report by the Texas Transportation Institute estimated the average metro Atlanta commuter spends 57 hours per year in traffic.¹⁰ Studies have linked physical inactivity and poor health outcomes to the amount of time spent in cars. One study found a 6% increase in the likelihood of being obese for every 60 minutes an individual spent in a car each day.¹¹ In the Atlanta metropolitan area, approximately 25% of individuals are obese compared to the nationwide average, which is 27%.¹²

The Atlanta BeltLine is strategically positioned to help reduce traffic congestion and provide opportunities for individuals to engage in physical activity through the development of multi-use trails. Metro Atlanta commuters spend approximately \$5,772 per household each year on gas, which is more than any other household in the entire country.¹³ Since Metro Atlantans spend more on gasoline, they are consequently spending more time in their cars, dependent on motor vehicles as a primary source of mobility. Estimates show that Metro Atlantans waste nearly 44 hours delayed or trapped by traffic each year.¹⁴ Traffic congestion is linked to other aspects of Atlantans daily lives as well as their communities including mental health, physical inactivity and poor air quality.

Rationale

A growing body of evidence links the use of trails and public spaces to increased levels of physical activity and improved health outcomes. Individuals who access parks and green space are almost three times as likely to meet the recommended physical activity levels compared to individuals who do not use public open spaces.¹⁵ Increased access to public spaces is also linked to higher levels of walking activity.¹⁶ Individuals who use trails at least one time during the week were two times as likely to meet the recommended physical activity requirements compared with individuals who rarely or never use trails.¹⁷ Since the BeltLine aims to build 33 miles of multi-use trails that links neighborhoods and resources, another goal of this research is to explore the impact of the BeltLine on active commuting (or active transportation) and active living.

Active living refers to a “way of life that integrates physical activity into the daily routine, and is an important aspect of preventing obesity among children and families.”¹⁸ There are many ways in which individuals can include physical activity in their daily lives such as cycling and walking to work or taking the stairs rather than the elevator. The presence of and increased access to multi-use trails is predicted to encourage adults and children to engage in more physical activity

10 Schrank, David & Lomax, Tim. (2009). 2009 Urban Mobility Report. Texas Transportation Institute: The Texas A&M University System.

11 Frank, Lawrence D., Andresen, Martin A., & Schmid, Thomas, L. (2004). Obesity relationship with community design, physical activity and time spent in cars. *Am J of Preventive Medicine*, 27(2), 87-96. Retrieved from [http://www.ajpm-online.net/article/S0749-3797\(04\)00087-X/abstract](http://www.ajpm-online.net/article/S0749-3797(04)00087-X/abstract)

12 The Atlanta metropolitan area includes 28 counties in Atlanta, Sandy Springs and Marietta. CDC, Smart BRFSS retrieved from <http://apps.nccd.cdc.gov/BRFSS-SMART/>

13 Sperling's Best Places, 2010

14 Texas Transportation Institute, 2010

15 Giles-Corti et al., 2005

16 ibid

17 Librett, et al., 2006

18 Robert Wood Johnson Foundation, 2010

for recreational purposes and also as a form of active transportation. As childhood obesity rates continue to climb the influence of increased physical activity and exposure to BeltLine initiatives like parks and multi-use trails area also relevant to this study and research goal.

Obesity rates for children between the ages of 6 – 11 quadrupled over the past 40 years.¹⁹ The Centers for Disease Control and Prevention recommends that children engage in at least 60 minutes of moderate-to-vigorous physical activity daily but studies reveal that less than half the children in the U.S. meet these recommendations.²⁰ Children who engage in physical activity at an early age might not be as susceptible to chronic diseases as an adult.²¹ Children who actively commute to school have higher physical activity rates compared to children who travel to school by other modes of transportation.²² Active commuting is not limited to children. Adults also have the opportunity to take advantage of this new network of multi-use trails to get to and from work.

Active commuters are individuals who bike, walk or ride transit to work. Active commuting to work could lead to regular walking and bicycling trips for recreational purposes (or physical activity) and help prevent the onset of chronic conditions if the level of physical activity of these trips meets the recommended guidelines.²³ Of individuals who utilize public transit, 29% met the recommended physical activity requirements for adults and on average transit users walked for about 19 minutes to and from their mode of public transit.²⁴ This data suggest that individuals who take public transportation might have the opportunity to engage in physical activity that brings them one step closer to meeting the recommended amount of daily physical activity. While so many adults struggle to meet the recommended physical activity requirements, utilizing public transit could be one quick solution to help adults engage in some physical activity on their way to work or other activities.

Research Goal

The goal for this research is to determine if multi-use trails constructed along the BeltLine influence active living and recreational physical activity levels. The research will be informed by a natural experiment and explore how individuals interact with the existing natural environment before and after the construction of multi-use trails along the BeltLine. In addition, quantitative data will be collected to measure key health indicators including Body Mass Index (BMI) and qualitative data will be collected to analyze individual behavior and perceptions of safety and use of trails for commuting and physical activity. This initial research is intended to inform a larger multi-year study that aims to research the following domains over the next decade as the BeltLine is implemented:

1. Physical Activity
2. Active Transportation
3. Childhood Obesity

¹⁹Ogden et al., 2008

²⁰ Active Living Research, 2009

²¹ Biddle et al., 2004

²² Cooper et al., 2003; Alexander et al., 2005

²³ Merom et al., 2008

²⁴ Besser and Dannenberg, 2005

4. Food Environments
5. Wellbeing (social and mental)
6. Health Economics

In addition to exploring how the BeltLine interacts and influences the six research domains listed above, the multi-year research will also explore and integrate four cross-cutting themes to further address the influence of the built environment on the six research domains and ensure that research findings inform future development and health interventions. The four cross-cutting themes that will be explored within each research domain includes:

- a. Policy: Ensure that key findings that emerge from the research are shared with policy-makers and key decision – makers.
- b. Community Engagement: Identify the community as a key stakeholder and engage the community throughout the entire research process
- c. Health Disparities: Identify and address all the ways in which health disparities influence health outcomes and access to services. Develop action plans and interventions to address health disparities.
- d. Innovation/Technologies: Incorporate the use of innovative technologies like smart phones and accelerometers into the study design.

The section below outlines the specific objectives and deliverables for the first and second phase of this initial multi-year research. Due to time restrictions as trails are currently under construction there are limitations to study before and after affects of multi-use trails on individual behavior and physical activity levels. Since the trails are currently under construction we propose to start exploring how multi-use trails influence physical activity levels and childhood obesity as soon as possible.

Objectives/Deliverables

Objective 1 (phase I): Conduct an environmental audit for multi-use trails that have already been constructed on the Southeast, Southwest and Northeast segments of the BeltLine. Measure individual behavior and use of trails in these communities.

- Activity 1.1: Modifying and adapting environmental audits such as the Path Environment Audit Tool (PEAT), and the Neighborhood Environment Walkability Scale (NEWS) to collect quantitative data regarding the safety, accessibility, aesthetics, functionality and proximity of local resources (i.e. shops, restaurants, food stores) to trail segments already constructed in the Southeast, Southwest and Northeast segments.
 - Deliverable: A written report that includes all of the indicators measured and describes the walkability/bikability of each trail segment measured. A well defined list of key features that enable trail use and a list of key features that are absent or weak which might lead to under-utilization of trails.
- Activity 1.2: Utilize inceptor-based survey tools such as the Recreation Trail Evaluation survey (RTES) and Research On Urban Trail Environments (ROUTES) to capture

behavior, trails use, predictors of trail use, and barriers to trail use from current trail users and non trail users during three different seasons during the year.

- Deliverable: Statistical analysis of the predictors and barriers of trail use to demonstrate the difference between trail users and non-users.²⁵
 - Deliverable: Qualitative analysis of trail features that predict trail use and a list of features that are barriers to trail use.
- Activity 1.3: Engage a group of community champions in each of the BeltLine communities where the study will be conducted. The community champions will be volunteers who will help collect data (i.e. intercept surveys, in-depth interviews, and focus group discussions) with the community. The community champions will also communicate the purpose of the study and provide updates during community forums and quarterly briefings. Community champions will also share input and feedback from the community to the researchers to create a two-way dialogue and foster trust and accountability within the BeltLine communities.
 - Deliverable: Group of community champions who will volunteer for at least one year (during Phase I) and will have the option to continue volunteering for Phase II.
 - Activity 1.4: Community champions will be trained on data collection, tools and protocols.
 - Deliverable: Well trained community champions that are familiar with data collection tools and methods and the purpose of this proposed study.

Objective 2 (phase I): Determine how multi-use trails influence the school community and active commuting to school behavior and childhood obesity.

- Activity 2.1: Conduct an observational assessment of the use of trails and green spaces by children who attend schools within 1 mile of the built and proposed multi-use trails on the BeltLine.
 - Deliverable: Analysis of the observational assessment to identify key behaviors and current utilization of trails by school-aged children.
- Activity 2.2: Conduct a survey or in-depth interviews with families and children living within one mile of the schools (for schools that are within one mile of the BeltLine) to collect information on trail use behaviors and perceptions of barriers from the perspective of families and school-aged children. Families and children that live farther than 1 mile from a local school will also be surveyed to collect data from potential non trail users which will serve as a control.
 - Deliverable: Qualitative and quantitative assessment of trail use and perceptions to barriers of trail use for families and children that are considered trail users compared to families and children that are not trail users.

²⁵ Previous studies have shown that it is often challenging to obtain enough information from non-trail users to demonstrate statistical significance of the responses from trail users and non-trail users.

Objective 3 (phase II): Measure individual behavior, perception to, and use of multi-use trails before and after construction (pre/post test design)

- Activity 3.1: Conduct pre-test interviews/questionnaires and focus group discussions with community members in at least 6 neighborhoods before the construction of planned trails in the Southeast, Southwest and Northeast sections.
 - Deliverable: Qualitative and quantitative analysis of predictors and barriers to trail use prior to the construction of the multi-use trails.
- Activity 3.2: Conduct post-test interviews/questionnaires and focus group discussions with the same community members in the same 6 neighborhoods after the construction of the trails in the Southeast, Southwest and Northeast sections to determine if perceptions of trails use and behavior has changed.
 - Deliverable: Qualitative and quantitative analysis of predictors and barriers to trail use after the construction of the multi-use trails.
 - Deliverable: Qualitative and quantitative analysis of the pre and post-test to determine any differences in attitudes, behaviors and perceptions before and after the construction of the trails.

Objective 4 (phase II): Use GIS/GPS/Accelerometers to collect quantitative data on individual's movement and travel patterns before and after the construction of new trails.

- Activity 4.1: Map the travel patterns of 30 individuals who live within 1 mile of proposed (but not currently constructed) BeltLine multi-use trails for 30 days using accelerometers and GPS positioning systems to map their current physical activity and trail use behavior in three distinct neighborhoods (Northeast, Southeast and Southwest).
 - Deliverable: Baseline map/study of individual travel patterns and physical activity behavior for individuals living in three distinct BeltLine communities.
- Activity 4.2: Baseline survey of the same 30 individuals who live within 1 mile of the **proposed** BeltLine multi-use trails to collect initial data on current travel behavior, perceptions of neighborhood walkability and barriers to trail use prior to the construction on trails. Conduct same baseline survey for individuals who do not live within 1 mile of the BeltLine to capture information from non trails users.
 - Deliverable: Baseline descriptive statistics of trail users and non-trail users, baseline travel behavior and perceived barriers for trail users and non-trail users.
- Activity 4.3: Map the travel patterns of 30 individuals who live within 1 mile of the **newly constructed** BeltLine multi-use trails for 30 days using accelerometers and GPS positioning systems to map their physical activity and trail use behavior in three distinct neighborhoods (Northeast, Southeast and Southwest).
 - Deliverable: Endline map/study of individual travel patterns and physical activity behavior for individuals living in three distinct BeltLine communities.
- Activity 4.4: Endline survey of the same 30 individuals who live within 1 mile of the proposed BeltLine multi-use trails to collect endline data on travel behavior, perceptions of neighborhood walkability and barriers to trail use following the construction of trails.

Conduct same endline survey for individuals who do not live within 1 mile of the BeltLine to capture information from non-trails users.

- Deliverable: Endline descriptive statistics of trail users and non trail users, baseline travel behavior and perceived barriers for trail users and non trail users after the construction of multi-use trails along the BeltLine.

Summary of objectives and activities:

Phase I: Conduct a cross sectional study in three distinct sections of the Atlanta BeltLine where trails have already been built (Southeast, Southwest, Northeast)

- Conduct an environmental audit/walkability audit to survey the condition of the trails and surrounding neighborhoods. The environmental audit will collect information on physical incivilities including abandoned buildings, vacant lots, poor lighting, and graffiti to determine barriers to trail use. The environmental audit will also document specific features that enable or predict trail use such as lighting, maintenance, proximity of trail to other resources and aesthetic appearance.
- Through general observations and intercept studies, obtain information on the general demographics (descriptive statistics) of the individuals currently utilizing trails including: socioeconomic status (SES), age, ethnicity, educational level, and weight and height to determine body mass index (BMI).
- Determine the primary reasons the individuals use the trails (recreation, commute to work, physical activity, active transportation, access to food) through observations and intercept surveys. Determine the average distance between the trails and individuals' homes and important locations such as the nearest grocery store, school, shopping mart, sources of entertainment, green space, and public transit station.
- Map location of liquor stores, proximity of grocery stores, and access to markets, shopping, and restaurants to determine if the proximity of these locations influences behavior and health outcomes.
- Determine the number of trails and current use of trails that influence neighborhood connectivity.
- Research the use of several interim trails on the Eastside²⁶ and how they contribute to development of future trails. Investigate the individuals who are using these temporary trails and for what purpose to inform the development and placement of future trails along the Atlanta BeltLine. Research what mode individuals are using to access the trails (i.e. road access, sidewalk connectivity etc.).

26 Eastside trails are located at 10th Street and Monroe in Fulton County.

- Determine if and number of children using trails to get to school (active commuting to school). Also determine if children use trails for physical activity as part of a school-based physical education program or after school as part of their own individual recreation.
- Research if newly built trails influence how children get to school (active commuting to school).
- Create a group of community champions, trained on basic data collection tools and methods who will serve as a bridge between the researchers and the community.

Phase II: Conduct a prospective cohort study that compliments the cross-sectional study outlined in objective one (phase I). The study will follow a group of individuals before and after the construction of the trails.

- Obtain information on the general demographics of the individuals in the cohort including: socioeconomic status (SES), age, ethnicity, educational level, and weight and height (to determine body mass index (BMI) at both baseline and endline.
- Document and research behavior change with a cohort of individuals to measure a change in behavior (use of and access to) multi-use trails before and after construction.
- Research levels of physical activity along trails using accelerometers to determine how far people walk using the trails and where the trails are most used. Map results using geographic information systems (GIS) to plot activity, and track land use.
- Through in-depth interviews explore how individual's perceive the trails including safety, access, and proximity to the places they frequent (grocery stores, school, work).

Expected Outcomes/Results:

Phase I

- Map the use of interim trails. Define the individuals that are currently using the interim trails, why they use the trails and any barriers.
- Gain a basic understanding of the number of people that use trails for physical activity, approximately how many times a week they use the trail for this purpose, and the type of physical activity they engage in (walk, bike, run).
- Understand if children can use the trails to get to school and report any barriers children encounter using trails to get to school.
- Foster trust and accountability with the BeltLine communities through the engagement of community champions.

Phase II

- Compare the change in behavior over time and analyze the influence infrastructure has on individual behavior and trail use.

- Report on trail use by children to get to school. Report if trail construction has led to behavior change in how children access and utilize trails for recreation and physical activity.
- Report on changes in BMI associated with multi-use trails. Report on changes in moderate-vigorous physical activity levels associated with multi-use trails.
- Compare and plot individual movements and mobility before and after trails are built to demonstrate use of trails and level of physical activity.
- Identify predictors for trail use.
- Generate a report that includes evidence-based data demonstrating how multi-use trails influence physical activity, active commuting, and connecting residents and trail users to a variety of resources (employment, recreation, education, grocery stores, shopping). This report will demonstrate the value the Atlanta BeltLine brings to the City of Atlanta, focusing specifically on the integration of multi-use trails.

Research Personnel

Georgia State University will serve as the lead organization working with a diverse array of partners to design a study, collect and analyze data and disseminate findings to inform future development and key stakeholders around the influence of the BeltLine on select health outcomes. In October 2010, Georgia State University's Institute of Public Health was awarded \$6.7 million from the National Institute of Health to develop a Center of Excellence in Health Disparities Research. The five-year, multi-million dollar award will support research pertaining to minority health, training opportunities and identifying opportunities to eliminate disparities in health care among underserved urban populations. The new Center of Excellence has identified three research priorities: to explore health outcomes in underserved and disadvantaged neighborhoods, identify how religion influences drug use and HIV transmission, and to reduce violence within families by creating a computer-assisted adaptation tool for at-risk fathers.

Georgia State University is also home to the Partnership for Urban Health Research (PUHR). The mission of PUHR is to research how the urban and built environment affects the health and well-being of Metro Atlantans. PUHR tailors its research to explore why under-served and marginalized urban populations disproportionately suffer from illnesses and diseases that may be influenced by their built environment. The Partnership for Urban Health Research seeks to incorporate interdisciplinary partnerships within the study designs.

Staff members from Georgia State University that will support the study objectives and research goals defined in this proposal include:

John Steward, MPH, Academic Professional: Mr. Steward serves as the Program Manager for the Partnership for Urban Health Research and is a Professor within the Institute of Public Health. Mr. Steward served in the Commissioned Corps for the United States Public Health Service for 30 years. He supported the Agency for Toxic Substances and Disease Registry with the Centers for Disease Control and Prevention. Mr. Steward also worked for 10 years with the India Health Service to eliminate health disparities and create healthy communities. Mr. Steward's research interests include injury and violence prevention, chronic disease, cardiovascular disease, alcohol and drug abuse, infectious disease and environmental health.

Dr. Rodney Lyn, Assistant Professor: Dr. Lyn's research focuses on childhood obesity prevention, school and community health and addressing health disparities. His expertise includes developing public policy to address behaviors and public health. Dr. Lyn is the Director of the Policy Leadership for Active Youth (PLAY) Initiative. Dr. Lyn has years of experience developing and working in partnership to create healthy communities and public policies that address childhood obesity and health. Dr. Lyn is currently the principal investigator researching the influence of safety net providers, community benefit activities, community needs, assets and health promotion at Piedmont Hospital.

Dr. Dajun Dai, Assistant Professor: Dr. Dai is a core faculty member with the Partnership for Urban Health Research as part of the Institute of Public Health. Dr. Dai is also an Assistant Professor within the Department of GeoSciences. Dr. Dai's expertise includes geographic information sciences (GIS), urban studies including transportation and urban and socioeconomic studies. Dr. Dai is currently engaging in research to explore quantitative methods in GIS, transportation in Metro Atlanta, urban poverty and justice and how spatial accessibility influences access to healthy food, health care, and epidemiology.

Dr. Frances McCarty, Assistant Professor: Dr. McCarty currently teaches courses on statistical methods. Previously she worked for 7 years at Emory University as a statistician and research assistant professor for the Behavioral Sciences and Health Education Department housed within the Rollins School of Public Health. Dr. McCarty has invaluable research experience managing complex data sets. She has served as the primary statistician for a number of projects analyzing HIV prevention, nutrition, exercise, obesity prevention and skin cancer prevention.

Partner Institutions

Through this research we propose to partner with the following individuals and organizations. Below is a brief description of the added value and support each expert and partner organization brings to this study proposal.

Centers for Disease Control and Prevention (CDC): The CDC's Division of Nutrition, Physical Activity and Obesity aims to collaborate and lead strategic partnerships to reduce obesity, chronic diseases and other poor health outcomes by promoting nutrition and physical activity. The CDC will share valuable guidelines, survey tools and instruments and well trained staff that are available to analyze and synthesize data. The CDC can help articulate key findings and data to inform policy changes aiming to improve population health. Colleagues at the CDC conducted a similar study in 2008 researching Neighborhood Parks and Active Living to profile park users and collect data that could be used to inform future park development that would increase park utilization. <http://www.cdc.gov/nccdphp/dnpao/index.html>

Emory University: Julie Gazmararian is an Associate Professor with the Department of Epidemiology within the Rollins School of Public Health at Emory University. Dr. Gazmararian's interests include the prevention and study of childhood obesity. She has a wealth of experience developing studies and designing surveys. Dr. Gazmararian's experience and interest would add value to the proposed study design to determine how parks, green space and multi-use trails influence childhood obesity.

Georgia Institute of Technology: The Center for Quality Growth and Regional Development (CQGRD) is dedicated to education research. CQGRD is located within Georgia Tech's College of Architecture and is a valuable state, national, and international resource for urban development. CQGRD core focuses address: emerging theories regarding current and future challenges with urban development, integrate innovation and technology, new evidence-based and best practices toward implementation, and educating key stakeholders on issues of quality growth and regional planning. CQGRD conducted the Health Impact Assessment on the BeltLine in 2007. <http://www.cqgrd.gatech.edu/>

Atlanta BeltLine Incorporation (ABI): ABI, formed by the Atlanta Development Authority, is the planning and executing entity for the implementation of the Atlanta BeltLine. ABI collaborates with several City of Atlanta departments. The core functions of ABI include finalizing the master plan for the BeltLine, securing federal, state and local funding, engaging the community, and monitoring and managing the overall implementation of the BeltLine plan. The Atlanta BeltLine Inc. regularly reports and tracks progress on the BeltLine to the Atlanta City Council, Atlanta Public Schools and Fulton County, which are the three taxing authorities that authorized the BeltLine TAD legislation in 2005²⁷.

Atlanta BeltLine Partnership: The Atlanta BeltLine Partnership (ABLP) is a non-profit organization whose mission is to raise funds to support the implementation of the BeltLine. ABLP collaborates with neighborhoods, community organizations, faith-based organizations, businesses and other groups to raise awareness and build support for the BeltLine. ABLP help build local partnerships, mobilizes resources and strives to continually educate and raise awareness about the current and future development of the BeltLine.⁵

Safe Routes to School (SRTS): SRTS partners with schools and school communities to facilitate and promote walking and biking to school in a safe environment for school-aged children. SRTS support schools by providing resources, technical assistance to implement safe walking and biking to school.

<http://www.dot.state.ga.us/localgovernment/fundingprograms/SRTS/Pages/default.aspx>

PEDS: PEDS is a nonprofit, member-based advocacy organization that promotes and encourages safe and accessible opportunities for pedestrians in metro Atlanta. PEDS provides feedback and raises awareness to improve engineering and design regarding the pedestrian environment to improve pedestrian safety. PEDS also works with drivers to educate them about pedestrian rights. <http://peds.org/about-peds/>

GeoStats: GeoStats focuses on the integration of new and emerging technologies, including Global Positioning System (GPS) and Geographic Information Systems (GIS), to collect, analyze, report, and disseminate transportation data. GeoStats supports the implementation of research by offering specialized consulting services to help craft and tailor the technologies to meet specific research goals and objectives. <http://www.geostats.com/index.htm>

²⁷ Atlanta BeltLine Overview <http://www.beltline.org/AboutUs/AboutUsOverview/tabid/1690/Default.aspx#ABI>

Timeline:

Phase I (12 – 13 months)

Activity	2010					2011							
	8	9	10	11	12	1	2	3	4	5	6	7	8
<i>Objective 1 (phase I): Conduct and environmental audit for multi-use trails that have already been constructed on the Southeast, Southwest and Northeast segments of the BeltLine. Measure individual behavior and use of trails in these communities.</i>													
Activity 1.1: Modifying and adapting environmental audits to collect quantitative data regarding the safety, accessibility, aesthetics, functionality and proximity of local resources to trail segments already constructed in the Southeast, Southwest and Northeast segments.													
Activity 1.2: Utilize inceptor-based survey tools to capture behavior, trails use, predictors of trail use, and barriers to trail use from current trail users and non trail users.													
Activity 1.3: Engage a group of community champions in each of the BeltLine communities where the study will be conducted. The community champions will be volunteers who will help collect data communicate the purpose of the study and provide updates during community forums and quarterly briefings to the community.													
Activity 1.4: Community champions will be trained on data collection, tools and protocols.													
<i>Objective 2: Determine how multi-use trails influence the school community and active commuting to school behavior and childhood obesity.</i>													
Activity 2.1: Conduct and observational assessment of the use of trails and green spaces by children who schools are within 1 mile of the built and proposed multi-use trails on the BeltLine.													
Activity 2.2: Conduct a survey or in-depth interviews with families and children living within one mile of the schools to collect information on trail use behaviors and perceptions of barriers from the perspective of families and school-aged children. Survey families and children that live farther than 1 mile from a local school.													
Data cleaning and analysis													
Final report and write up													

Phase II (2 – 5 years). The timeline below is only for the proposed Year 1 of Phase II

Activity	2011					2012							
	8	9	10	11	12	1	2	3	4	5	6	7	8
Objective 3: Measure individual behavior, perception to, and use of multi-use trails before and after construction (pre/post test design)													
Activity 3.1: Conduct pre-test interviews/questionnaires and focus group discussions of community members in select neighborhoods before the construction of trails.													
Activity 3.2: Conduct post-test interviews, questionnaires and focus group discussion with the same community members in neighborhoods after the construction of trails.													
Objective 4): Use GIS/GPS/Accelerometers to collect quantitative data on individual’s movement and travel patterns before and after the construction of new trails.													
Select cohorts													
Train cohorts to use accelerometers & GPS equipment													
Activity 4.1: (pre) Map the movement of individuals who live within 1 mile of proposed BeltLine multi-use trails for 30 days using accelerometers and GPS positioning systems to map their physical activity and trail use behavior in three neighborhoods (NE, SE SW).													
Activity 4.2: Baseline survey of the same individuals who live within 1 mile of the proposed BeltLine multi-use trails. Conduct same baseline survey for individuals who do not live within 1 mile of the BeltLine to capture information from non-trails users.													
Activity 4.3: Map the movement of individuals who live within 1 mile of the newly constructed BeltLine multi-use trails for 30 days using accelerometers and GPS positioning systems to map their physical activity and trail use behavior in three distinct neighborhoods (northeast, southeast and southwest).													
Activity 4.4: Endline survey of individuals who live within 1 mile of the proposed BeltLine multi-use trails. Conduct same baseline survey for individuals who do not live within 1 mile of the BeltLine to capture information from non-trails users.													
Final analysis (outside this timeframe). Post August 2012													
Final report (outside this timeframe). Post August 2012.													

Budget

Phase I:

Line item	Amount
Salaries	\$94,570
Benefits	\$26,871
Graduate Research Assistants	\$5,000
Supplies	\$6,460
Meeting expenses	\$2,000
Participant Incentives	\$5,000
Local travel	\$1,000
Sub grants to partners	\$100,000
Total Direct Costs	\$310,901
Indirect costs (45%)	\$139,905
Total Project costs	\$450,806

Phase II:

Line item	Amount
Salaries	\$151,395
Benefits	\$45,419
Graduate Research Assistants	\$10,000
Supplies	\$24,760
Meeting expenses	\$2,000
Participant Incentives	\$5,000
Local travel	\$1,000
Consultants	\$25,000
Sub grants to partners	\$100,000
Total Direct Costs	\$364,574
Indirect costs (45%)	\$164,058
Total Project costs	\$528,632

Total Project Budget (phase I and phase II): \$979,438

Detailed Budget:

Phase I

Salary			
	Monthly Rate	level of effort on project (% of time)	Amount
Director	\$8,000	20	\$20,800.0
Program Manager /Project Coordinator	\$4,100	100	\$53,300.0
Project staff	\$3,500	25	\$11,375.0
Admin Staff	\$2,100	15	\$4,095.00
1 GRA	\$5,000/year		\$5,000
Total			\$94,570
Benefits			
Director	30% of total salary		\$6,240.0
Program Manager /Project Coordinator	30% of total salary		\$15,990.0
Project staff	30% of total salary		\$3,412.5
Admin Staff	30% of total salary		\$1,228.50
Total			\$26,871.0
Supplies			
	Unit/Rate	Quantity	Amount
Flip chart paper	\$40	10	\$400
Markers	\$5	3	\$15
Notebooks	\$2	10	\$20
Pens	\$5	5	\$25
PDA	\$500	6	\$3,000
Bikes	\$600	5	\$3,000
Meeting expenses			\$2,000
Participant incentives			\$5,000
Total			\$13,460
Local Travel			
	rate .51/mile	number of miles	Amount
3 trips for each intercept survey (3 drivers, driving on average 10 miles in one direction)		60	\$20

12 trips to visit community champions (average round trip is 25 miles). Anticipated that there will be one community champion in each of the three neighborhoods.		900	\$459
Mileage to reimburse community champion trainings. At least 6 drivers. Average round trip is 25 miles		150	\$77
Total			\$1,000
Subgrants			
Emory			\$75,000
BeltLine, Inc.			\$25,000
Total			\$100,000
Direct Costs			\$310,901
Indirect costs			\$139,905
Total Project Costs			\$450,806

Phase II

Salary			
Salaries	monthly rate	level of effort on project (% of time)	Amount
Director	\$8,500	40	\$40,800.0
Program Manager /Project Coordinator	\$5,000	100	\$60,000.0
Statistician	\$7,500	20	\$18,000.0
GIS	\$7,500	20	\$18,000.0
Project staff	\$3,500	25	\$10,500.0
Admin Staff	\$2,100	15	\$4,095.00
Total			\$151,395.00
Benefits			
Director	30% if total salary		\$12,240.0
Program Manager /Project Coordinator	30% if total salary		\$18,000.0
Statistician	30% if total salary		\$5,400.0
GIS	30% if total salary		\$5,400.0
Project staff	30% if total salary		\$3,150.0

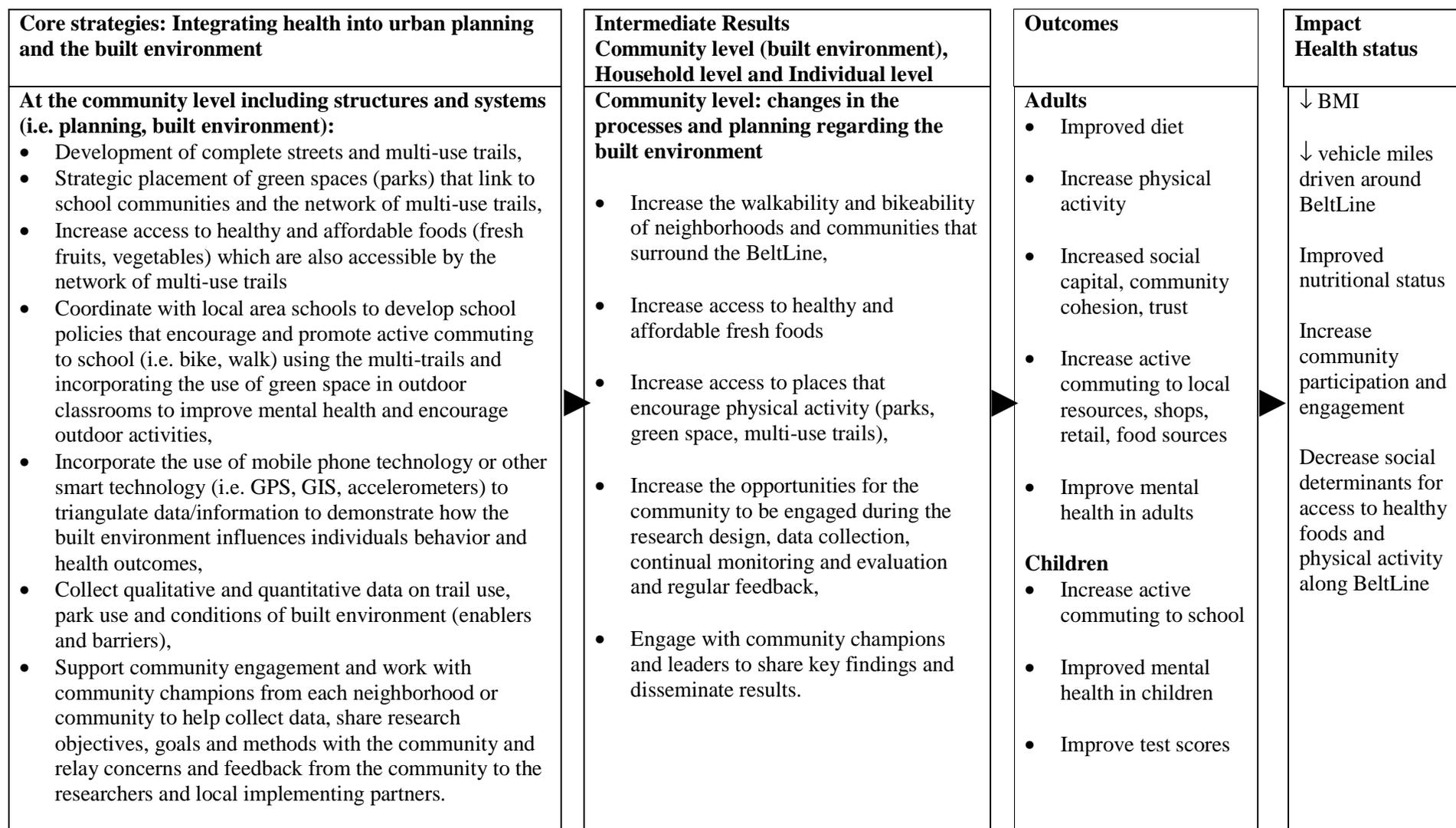
Admin Staff	30% if total salary		\$1,228.50
Total			\$45,419
GRA	Annual rate		
2 GRA	\$5,000/year		\$10,000
Supplies			
	Unit/Rate	Quantity	Amount
Flip chart paper	\$40	10	\$400
Markers	\$5	3	\$15
Notebooks	\$2	10	\$20
Pens	\$5	5	\$25
Accelerometers	\$300	60	\$18,000
GPS	\$75	60	\$4,500
Bikes	\$600	3	\$1,800
Meeting expenses			\$2,000
Participant incentives			\$5,000
Total			\$31,760
Local Travel			
	rate .51/mile	Number of miles	Amount
Selection of cohorts in three communities. At least two trips to three communities (25 miles each trip)	rate .51/mile	150	\$77
Training of cohorts on use of GPS, accelerometers	rate .51/mile	150	\$77
Visits to community for endline surveys	rate .51/mile	150	\$77
Visits to see community champions	rate .51/mile	900	\$459
Total			\$1,000
Consultants			
Geostats			\$25,000
Subgrants			
CQGRD			\$100,000
Direct Costs			\$364,574
Indirect costs (45%)			\$164,058
Total Project Costs			\$528,632

Appendix B: Fundraising Matrix

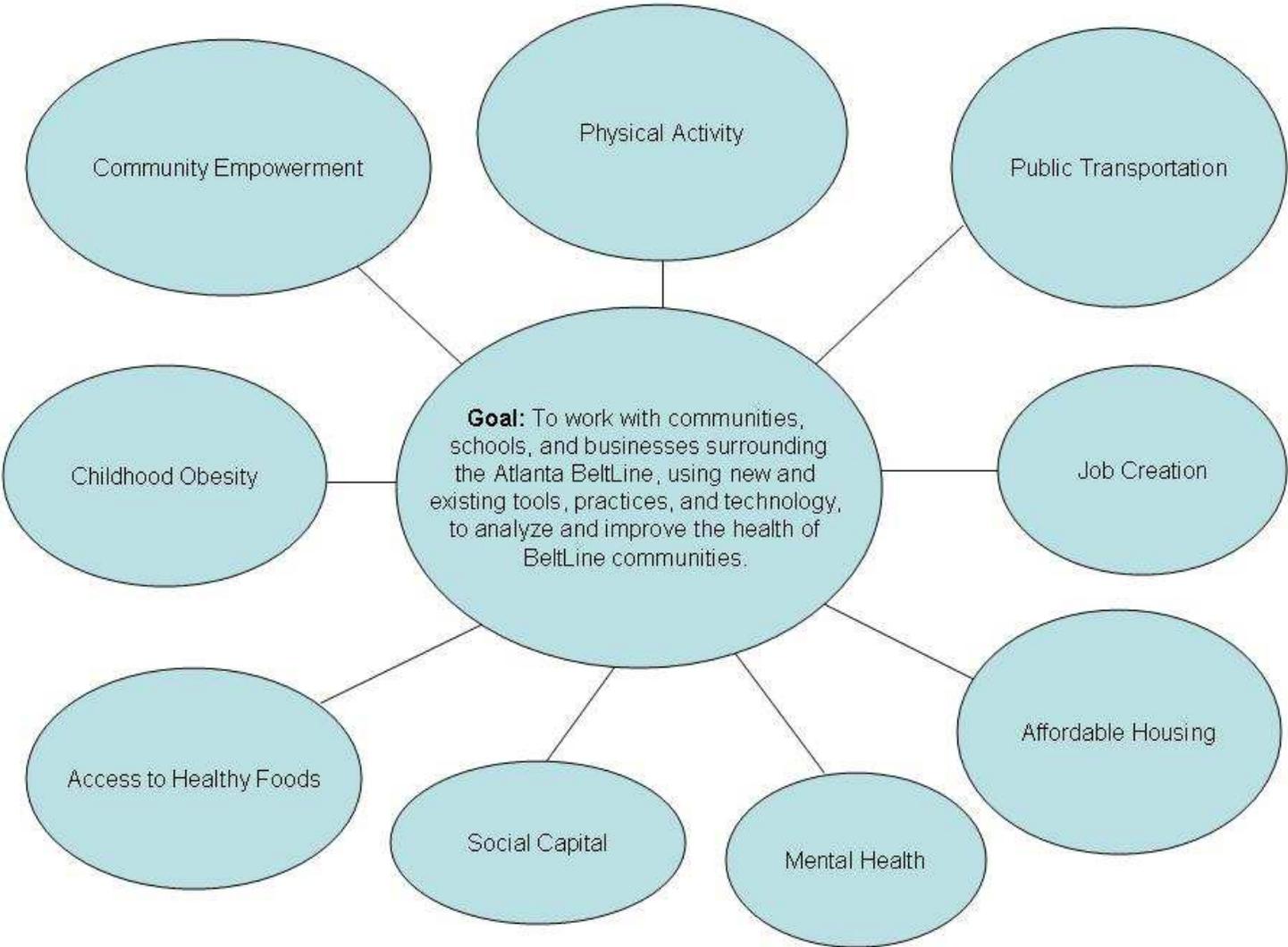
Title	Donor/Org	Description/Details	Budget	Budget period	Important Dates/Deadlines
Diet and Physical Activity					
Obesity Policy Research: Evaluation and Measures (R21) PA-10-028	NIH, CDC	<ul style="list-style-type: none"> • Conduct research on obesity-related natural experiments. • Develop/validate community level measures (instruments to assess and food and PA and the environment). • Inform public policy and research about diet and PA behavior and weight and health outcomes in US. • Ex of obesity-related natural experiments include: active transport options. Ex of community level measures: validate/test instruments to assess populations at high risk for obesity, poor diet and inactivity; formative research (qualitative) 	Limit \$275,000 in direct costs for two years. Limit \$200,000 direct costs in one year.	May not exceed 2 years	Opening date: Jan 16, 2010 Expiration date: Jan 8, 2013
Community Requests: Active Healthy Living	Coca-Cola Foundation	One of cokes priority areas: Healthy and Active Lifestyles. To support access to exercise, physical activity and nutritional education programs, programs that motivate behavior modification, and programs that encourage lifestyle/behavioral changes	Not listed	Not listed	Applications are accepted year round. No dates. No deadlines
Improving Diet and Physical Activity Assessment (R01) PAR-09-224	NIH	<ul style="list-style-type: none"> • Novel assessment approaches, better methods to evaluate instruments, • assessment tools for culturally diverse populations, • improve technology to better measure/investigate multidimensionality of diet and PA behavior through pattern analysis, • integrated measurement of diet and PA with environmental context of behaviors. 	Direct costs range \$200,000 - \$650,000	Usually 3 - 5 years	Letters of Intent due dates: May 5, 2010; Jan 5, 2011; Sep 5, 2011; May 5, 2012 Application due dates: June 5 2010; Feb 5 2011; Oct 5 2011; June 5 2012
Childhood Obesity Prevention					
Community-Based Partnerships for Childhood Obesity Prevention and Control: Research to Inform Policy (R21) PA-09-141	NIH, CDC	<ul style="list-style-type: none"> • Promote multi-level approach to childhood obesity. • Have researchers, policymakers and key stakeholders involved in each phase of research process. • Collaborate and emphasize the socio-ecological perspective to childhood obesity. • Research scope: consult with relevant policymakers; address childhood obesity with policy needs in line; teams work collaboratively; policy-driven analysis including urban planning, transportation, aspects of built environment. 	Limit \$275,000 in direct costs for two years. Limit \$200,000 direct costs in one year.	May not exceed 2 years	Opening date: May 16 2009 Expiration date: May 8 2012

Active Living Research: Building Evidence to Prevent Childhood Obesity	RWJF	<ul style="list-style-type: none"> studies on emerging or anticipated changes in physical activity-related policies or environments. What they fund: promote healthy eating among children to prevent childhood obesity, special emphasis on reaching the children at greatest risk for obesity (black, Latino, low-income communities), Target populations include children and adolescents ages 3 to 18 and their families. Goal: build a multidisciplinary field of research and a diverse network of researchers. Encourage interdisciplinary research teams and seek proposals from researchers representing a variety of disciplines, such as nutrition, agriculture, food science, behavioral science, economics, law, medicine, public policy, marketing and urban planning. 	\$150,000/ proposal	Up to 18 months	Grants are awarded on a rolling basis. Letters of intent may be submitted at any time until July 1, 2011 (5 p.m. ET)
Cancer Prevention, Diet and Physical Activity					
AICR Research Grant Proposal Investigator Initiated Grants (IIG)	American Institute for Cancer Research	<ul style="list-style-type: none"> Strengthen the evidence for nutritional or PA exposures in relation to cancer. Evaluate effect modification by environmental and genetic factors on cancer risk. Investigate mechanisms that link foods and drinks, dietary constituents or other nutritional and PA factors to cancer risk. Assess whether weight loss in overweight or obese people can reduce cancer risk. Identify and study the relevant milestones in the timing of growth and development that affect cancer risk and how they can be modified by food, nutrition and PA. Examine how measures of food, nutrition, physical activity and body composition, in relation to cancer risk, can be improved 	Max \$150,000 for up to two years, 10% indirect costs, with a limit of \$75,000 direct costs in any one year. Limited IIGs will be awarded for up to 3 years for a maximum of \$225,000, plus 10% in indirect costs, with a limit of \$75,000 direct costs in any one year. Can renew once.	Up to 2 years	letters of Intent: Jan 25 2011
Technology/ GIS/GPS					
In-Kind Product Donations	Google Foundation	<ul style="list-style-type: none"> Google's tools can effectively for creating awareness, fundraising, and operating more efficiently. Learn more at Google for Non-Profits, or check out specific non-profit product offerings below. Google Apps for Non-Profits allows for free communication, collaboration and publishing tools, including email accounts, for qualifying non-profits with up to 3,000 licenses Google Earth Outreach, our Google Earth and Maps resource for non-profits, helps non-profits visualize their cause and tell their story in Google Earth and Maps. Google MapMaker is a tool that allows users to contribute, share and edit map information for 174 countries and territories around the world. 	Not listed	Not listed	Not listed

Appendix C: Conceptual Framework (chart)



Appendix D: Research Domains



Appendix E: BeltLine Health Proposal Multi-Year Strategy²⁸

Executive Summary

The Atlanta BeltLine is a groundbreaking redevelopment project re-shaping Atlanta residents' access to, multi-use trails, public parks, public transportation, housing and employment opportunities. The Atlanta BeltLine, projected at \$2.8 billion, is revitalizing a 22-mile stretch of unused or under-utilized railroad corridor encircling downtown Atlanta. This project is hailed as the largest and most comprehensive development initiative ever undertaken in the City of Atlanta. An interdisciplinary team of public health professionals, urban planners, academics and trail design experts are working together to conduct a health study on the impacts of an extensive trail network spanning more than 33 miles and connecting over 46 diverse communities in Atlanta.

At the core of the BeltLine project is an effort to increase the use of the multi-use trails, and improve access to and utilization of public transportation. Atlanta currently ranks third in the entire nation for the highest traffic congestion. A 2009 report by the Texas Transportation Institute estimated the average metro Atlanta commuter spends 57 hours per year in traffic.²⁹ Studies link physical inactivity and poor health outcomes to the amount of time spent in cars. One study found a 6% increase in the likelihood of being obese for every 60 minutes an individual spent in a car each day.³⁰ In the Atlanta metropolitan area, approximately 25% of individuals are obese compared to the nationwide average, which is 27%.³¹ The Atlanta BeltLine is strategically positioned to help reduce traffic congestion and provide opportunities for individuals to engage in physical activity through the development of multi-use trails.

Research indicates that the built environment influences physical activity levels, perceptions regarding safety, access to resources, community engagement and social capital. Trends in active living by design are also influencing the way the built environment is designed to encourage an active lifestyle and incorporate community input in development. Active living refers to a “way of life that integrates physical activity into the daily routine, and is an important aspect of preventing obesity among children and families.”³²

A multi-sectoral and multi-institutional partnership with representatives from the Centers for Disease Control and Prevention, Emory University, Georgia Institute of Technology, Georgia State University, Atlanta BeltLine Inc. and the Atlanta BeltLine Partnership formed the BeltLine Health Proposal Committee. The purpose of this group is to research and quantify the influence of the BeltLine on health outcomes and overall wellbeing of neighborhoods and communities

²⁸ This draft strategy is a late development and has not been fully vetted with the other members of the BeltLine Health Proposal Committee prior to the submission of this Capstone.

²⁹ Schrank, David & Lomax, Tim. (2009). 2009 Urban Mobility Report. Texas Transportation Institute: The Texas A&M University System.

³⁰ Frank, Lawrence D., Andresen, Martin A., & Schmid, Thomas, L. (2004). Obesity relationship with community design, physical activity and time spent in cars. *Am J of Preventive Medicine*, 27(2), 87-96. Retrieved from [http://www.ajpm-online.net/article/S0749-3797\(04\)00087-X/abstract](http://www.ajpm-online.net/article/S0749-3797(04)00087-X/abstract)

³¹ The Atlanta metropolitan area includes 28 counties in Atlanta, Sandy Springs and Marietta. CDC, Smart BRFSS retrieved from <http://apps.nccd.cdc.gov/BRFSS-SMART/>

³² Robert Wood Johnson Foundation, 2010

proximate to the BeltLine. This committee will explore the elements of the natural environment and individual physical activity levels and elements of the built environment that influence a variety of health outcomes as the BeltLine develops over the next decade.

Many components of the BeltLine's strategy align with the principles of active living by design. This multi-sectoral and multi-institutional partnership is interested in studying the intersection of health and the BeltLine. The BeltLine Health Proposal Committee seeks to ensure a holistic approach to developing built environments that factor in the whole community and future growth of communities encouraging healthy food environments, job opportunities, and access to green spaces and open public spaces, and mobility. Active living by design strives to create a "culture" of engaging in physical activity during daily life and collaborating with local agencies and organizations to work with communities to develop the built environment in a way that enables an active lifestyle.³³ The BeltLine is re-designing elements of Atlanta that has the potential to change the way individuals commute, engage in physical activity and perceive their community.

Over the next 10 years, we aim to study the environmental indicators, behavior change indicators, perceptions, and health outcomes associated with the following domains. The individual domains are explained in more detail below:

1. Physical Activity
2. Active Transportation
3. Food Environment
4. Childhood Obesity
5. Wellbeing
6. Health Economics

In addition to the domains identified above, we will also integrate and focus on four key cross-cutting components that influence and are linked to each of the main research domains. The four cross-cutting components include:

- e. Policy: Ensure that key findings from research are shared with policy-makers and key decision – makers. Engage in policy analysis where current policies exist (i.e. school physical activity policies) and make recommendations to modify policies that can improve the health of the community where appropriate.
- f. Community Engagement: Identify the community as a key stakeholder and engage the community throughout the entire research process: identification of issue, research design and methodology, data collection, dissemination of key findings and key stakeholder meetings.
- g. Health Disparities: Identify and address all the ways in which health disparities influence health outcomes and access to services (i.e. healthy foods and public transportation). Develop action plans and interventions to address barriers and health disparities.
- h. Innovation/Technologies: Incorporate the use of innovative technologies like smart phones and accelerometers into the study design. Develop new study designs that use a variety of technologies to complement the quantitative data and can serve to build community capacity

³³ ibid

and increase access to resources and information by creating a two-way dialogue using technology platforms (i.e. social networking).

I. Physical Activity

Description of Domain: Physical activity is associated with many important health benefits. Regular physical activity can reduce the risk of obesity, cardiovascular disease, and type 2 diabetes. Engaging in physical activity strengthens bones and muscles, and improves mental health and overall wellbeing.³⁴ Adults between the ages of 18 and 64 are encouraged to engage in 150 minutes of moderate-intense aerobic activity each week and do muscle-strengthening activities as least 2 days a week. Alternatively, adults could engage in 75 minutes of vigorous-intense aerobic activity and do muscle-strengthening activities at least 2 days each week.³⁵ Moderate physical activity includes activities that raise the heart rate and causes an individual to sweat (i.e. walking fast, riding a bike on level ground, or pushing a lawnmower). Vigorous physical activity raises the heart rate even more and makes it difficult to say a few words without having to take a deep breath (i.e. running, swimming laps, and riding a bike up hills).⁷

Research Questions:

- Do multi-use trails along the BeltLine encourage individuals who live in neighboring communities to engage in physical activity?
- Does the presence of multi-use trails and parks along the BeltLine allow trail users to meet the recommended physical activity limits for their age category?
- What are the perceived elements of the multi-use trails and parks that prevent or inhibit individuals from using them for physical or leisure activity?
- What do environmental audits such as bikeability assessments and walkability audits conclude about the multi-use trails and parks that are predictors of trails use or barriers to trail use?

Components/Elements to measure:

- i. Walkability: An assessment of the features that make a route appear safe and inviting to those wishing to walk.
- ii. Bikeability: An assessment of the features that make a route appear safe and inviting to those wishing to bike.
- iii. Neighborhood Perceptions: A survey of residents on how they perceive their neighborhood and what impacts those perceptions have on their physical activity levels and overall health. Analysis of resident's perception of safety and risk of injury regarding the use of multi-use trails and parks.

II. Active Transportation/Active Commuting

³⁴ CDC, 2010, Physical Activity and Health, <http://www.cdc.gov/physicalactivity/everyone/health/index.html>

³⁵ CDC, 2011, March 30, How much physical activity do adults need?
<http://www.cdc.gov/physicalactivity/everyone/guidelines/adults.html>

Description of Domain: Active commuters are individuals who bike, walk or ride transit to work. Active commuting to work could lead to regular walking and bicycling trips for recreational purposes (or physical activity) and help prevent the onset of chronic conditions if the level of physical activity of these trips meets the recommended guidelines.³⁶

Research Questions:

- Do multi-use trails along the BeltLine enable individuals to actively commute to work or to other important destinations (i.e. grocery store, shops and restaurants)?
- Are the multi-use trails well positioned so they are proximate to resources that individuals commonly seek such as places of employment, food stores, shops, restaurants and places of entertainment?
- Do individuals perceive the multi-use trails as a safe and viable mechanism to walk or bike to work and other destinations?
- What are the predictors and barriers associated with the multi-use trails that predict and inhibit trail use for active commuting?
- How close are trail corridors to residential neighborhoods and other areas of interest?
- What routes or modes of transportation do people have to take in order to reach the trail?
- Are trails compliant with the American Disability Act? Do trails incorporate elements of universal design?

Components/Elements to measure:

- i. Access to Trails: A measure of the proximity and use of trails and other open space features and the identification of barriers to increased use. Analysis of built environment features to ensure safety and reduce the risk of injury.
- ii. Trail Features/ Inventory: An assessment of the features that are included within a park/ trail corridor and the activities that enable or prohibit trail use.
- iii. Trail Use: An assessment of who is using the multi-use trails and parks and for what purpose they utilize the trails and parks.
- iv. User/ Non-user Perceptions: A qualitative survey of why an individual does or does not use the BeltLine multi-use trails for active commuting.

III. Food Environment

Description of Domain: Access to healthy eating and nutritious, fresh foods is also linked to the built environment and health outcomes. In addition to regular physical activity, a healthy diet can also reduce the risk factors for heart disease, cancer and diabetes, which are some of leading causes of mortality and morbidity in the U.S.³⁷ The structure and design of the built environment, including the proximity of food stores, can influence where and how individuals access

³⁶ Merom, D., Miller, Y. D., van der Ploeg, H., & Bauman, A. (2008). Predictors of initiating and maintaining active commuting to work using transport and public health perspectives in Australia. *Preventive Medicine*, 47, 342 – 346.

³⁷ CDC, 2010, June 3, Health Food Environment, http://www.cdc.gov/healthyplaces/healthtopics/healthyfood_environment.htm

affordable, healthy foods.³⁸ Low-income neighborhoods and underserved communities tend to have fewer options and access to affordable, quality healthy food options including fresh produce.³⁹ Planning for healthy food environments that enables individuals to have access to healthy and affordable foods is instrumental in the design of the built environment including multi-use trails and public transit, which can help individuals access food resources.

Research Questions:

- Are healthy food options available in BeltLine communities?
- Do multi-use trails and public transit provide residents with the mobility to seek healthy and affordable food options?
- How many fast food restaurants are located in BeltLine communities?
- Do residents want additional healthy, food options?
- Are there other options for community members to obtain healthy food such as community gardens, community farmers markets or partnerships with existing food marts to sell healthier food items?
- Do community members have access to information about healthy diets and nutritious foods?

Components/Elements to Measure:

- i. Healthy Eating: Access to Healthy Food Choices: The availability and affordability of healthy food choices such as fresh produce.
- ii. Food Desert Audit: Mapping and inventory of available distributors of food products.
- iii. Farmers' Market/ Vendor Potential: A feasibility analysis for locating farmers' markets or other healthy food distribution systems within the BeltLine study area.
- iv. Community Gardens: A feasibility analysis for locating community gardens within the BeltLine study area.
- v. Nutrition Education: The inclusion of information on nutritious food choices on trail documents and in programs associated with the trails/ parks.
- vi. Programs Along Trails/ In Parks: An evaluation of the programs such as food preparation demonstrations, label reading etc. along the trail or as part of festivals within the parks.

IV. Childhood Obesity/School Environment

Description of Domain: Obesity rates for children between the ages of 6 – 11 quadrupled over the past 40 years.⁴⁰ The CDC recommends that children engage in at least 60 minutes of moderate-to-vigorous physical activity daily but studies reveal that less than 50% of the children in the US meet these recommendations.⁴¹ Children who engage in physical activity at an early age are less likely to be susceptible to chronic diseases as an adult.⁴² Proximity and utilization of

³⁸ Papas et al., (2007). The Built Environment and Obesity. *Epidemiologic Reviews*.

³⁹ *ibid*

⁴⁰ Ogden, C., Carroll, M. & Flegal K. (2008). High body mass index for age among US children and adolescents, 2003 – 2006. *JAMA*, 299(20), 2401 – 2405.

⁴¹ Active Living Research, 2009

⁴² Biddle, S., Gorely, T., & Stensel, D. (2004). Health-enhancing physical activity and sedentary behaviour in children and adolescents. *Journal of Sports Sciences*, 22, 679-701.

multi-use trails and parks can engage children in higher levels of physical activity and encourage active commuting to school. Children who actively commute to school have higher physical activity rates compared to children who travel to school by other modes of transportation.^{43,44} It is important to understand the perceived and actual risks or barriers to active commuting to school. Research would include exploring elements of safety and crime as well as features of multi-use trails that predict trail use for active commuting to school.

Research Questions:

- Do schools have policies on physical activity and healthy eating?
- Are schools that are proximate to the BeltLine planning on utilizing BeltLine trails or parks in physical education courses and/or as outdoor classrooms?
- How did children get to and from school before the BeltLine trails and parks were built? How will the new trails and parks influence how children exercise and get to and from school?
- Does proximity to BeltLine parks and trails influence mental health, test scores, ADD, ADHD and other learning disorders that children face?
- What are teachers' and parents' perceptions of multi-use trails and parks with respect to their children's physical activity levels and ability to improve test scores?

Components/Elements to measure:

- i. Physical Activity: The amount and quality of physical activity children are receiving.
- ii. Safe Routes to School: Do the schools in close proximity to the BeltLine have a Safe Routes to School Program and can their joint efforts be coordinated?
- iii. Physical Education: Do the schools in close proximity to the BeltLine have physical education programs and can they develop a curriculum that takes advantage of the proximity to parks/ trails?
- iv. Children Use of Parks/Trails: How and why are children using the parks/ trails?
- v. Healthy Eating: The ability to make healthy food choices at school and at home. Analysis of food offered in schools: Do the schools in close proximity to the BeltLine offer healthy food choices?
- vi. School Gardens: Conduct a feasibility analysis to explore if School Gardens can serve as a means of educating children on nutrition and motivate them to eat healthier food.

V. Wellbeing

Description of Domain: Wellbeing is an important indicator that demonstrates how individuals perceive how happy they are with their lives. Elements that influence wellbeing include access to affordable and quality housing, healthy food options, and access to employment, and places of recreation. Mapping these elements helps researchers understand how and why individuals feel

⁴³ Alexander LM, Inchley J, Todd J, Currie D, Cooper AR, Currie C. (2005). The broader impact of walking to school among adolescents: seven day accelerometry based study. *BMJ*, 331, 1061–2.

⁴⁴ Cooper AR, Page AS, Foster LJ, & Qahwaji D. (2003). Commuting to school: are children who walk more physically active? *Am J Prev Med*, 25, 273– 6.

connected to their communities and examine the barriers that impede individuals from achieving their full potential and living a quality lifestyle that meets their needs. Indicators that aim to measure quality living conditions should consider “what people think and feel about their lives, such as the quality of their relationships, their positive emotions and resilience, the realization of their potential, or their overall satisfaction with life.”^{45,46} Wellbeing includes elements of mental and physical health and strives to contribute to a holistic approach to happiness and positive health outcomes. Wellbeing is further defined as physical well-being; economic well-being; social well-being; emotional well-being; psychological well-being; life satisfaction; and access to fun activities and employment.⁴⁷

Research Questions:

- Are residents happy with their current lifestyle?
- Has the BeltLine influenced how residents perceive their wellbeing? Are individuals happier as a result of the BeltLine initiatives?
- What are some of the barriers that exist in the built environment that prevent or inhibit people from achieving their optimal wellbeing?
- How do individuals perceive their health status?
- Do individuals feel safe and connected with the neighborhoods and built environment?

Component/Elements to measures:

- iv. Mental Health: Nature Deficient Disorder/ Attention Span; Decreased Anxiety/ Violence; Levels of happiness and satisfaction with quality of life
- v. Social Capital: Mutual trust with community members; perceptions of neighborhood safety; opportunities to engage with community and neighbors; opportunities to contribute to the BeltLine community development process.

VI. Health Economics

Description of Domain: With respect to the BeltLine we are most concerned with researching how housing and job opportunities influence individuals’ perceptions of the neighborhoods, access to affordable housing, access to new job opportunities and how BeltLine developments contribute to increased quality of life.

Research Questions:

- Are residents satisfied with the job opportunities in their neighborhood?
- Are new job opportunities available as a result of BeltLine developments?
- What types (i.e. industries) of employment are available?
- Is affordable housing available?

⁴⁵ CDC. (2011, March 17). Health-related quality of life. Well-being concepts. Available from <http://www.cdc.gov/hrqol/wellbeing.htm>

⁴⁶ Diener E, Seligman ME. Beyond money. Toward an economy of well-being. *Psychological Science in the Public Interest* 2004;5(1):1–31.

⁴⁷ *ibid*

- How has the integration of affordable housing changed the neighborhood and community dynamics?
- Are there more opportunities for neighborhood residents to access health care and health services?
- Is there a balance between new job opportunities and new affordable housing units?

Components/Elements to measure:

- i. Housing: Affordability; Location/Accessibility; Type/ Mixture
- ii. Job Creation: Construction of BeltLine; Businesses along BeltLine; Number of local employers and employees; Job Quality; Job/Housing balance/ Commuting. Link to how job security leads to improved health outcomes (i.e. ability to purchase healthy foods, exercise, affordability of medical care)
- iii. Access to health care and health services. Link to improved health outcomes over time.