A TALE OF TWO TRAILS: EXPLORING DIFFERENT PATHS TO SUCCESS

by

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ABSTRACT

JENNIFER GILCHRIST WALKER: A tail of two trails: Exploring different paths to success
(Under the direction of Philip Bors, MPH and Daniel A. Rodriguez, Ph.D.)

This comparative case study investigates two successful trail development initiatives, using the Active Living by Design Community (ALbD) Action Model as an analytical framework. The model includes five strategies: preparation, promotion, programs, policy, and physical projects. Key stakeholders at each site participated in interviews (N = 14). Data were analyzed for content using AtlasTi. Trail traffic counts were conducted to augment qualitative data. Both communities demonstrated robust trail development strategies, but minimal integration with trail use encouragement strategies. Strengths and weaknesses varied depending upon the role of local government. Communities with different levels of government support each contributed unique lessons to inform best practices of trail development initiatives. To maximize physical activity impacts, however, public health professionals must play a greater role in community trail initiatives. The ALbD Community Action Model provides a viable framework with which to structure public health involvement in future community trail initiatives.
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INTRODUCTION

The need to increase physical activity across the population is a well-established public health objective (U.S. Department of Health and Human Services [USDHHS], 1999), and trends in physical activity promotion now place a greater emphasis on the creation of environments that support active lifestyles (Hoehner, Brennen, Brownson, Handy & Killingsworth, 2003). Correspondingly, multi-use trails have generated considerable attention as a means to encourage physical activity, given their potential to stimulate recreational as well as utilitarian walking and bicycling (Eyler et al., 2008). Such advantages make trail initiatives relevant to public health and urban planning professional alike. Despite recent research efforts to study the process and impacts of trail building, the relationship between trails and physical activity remains unclear. Research has yet to specify the best practices and circumstances in which trails likely increase physical activity, and the field also lacks implementation models to guide initiatives towards such objectives (Dunn & Blair, 2002).

This study aims to strengthen the body of knowledge around trail development and physical activity. Using a comparative case study framework, it examines trail development initiatives in two Southeastern United States communities: Durham, North Carolina and Georgetown County, South Carolina. The sites were characterized by government versus grassroots advocacy-led initiatives, respectively. Such differences in leadership provided meaningful comparisons among the strengths and weaknesses of each approach. Using the Active Living by Design “Community Action Model” as a conceptual framework, the analysis explores each site’s use of 5 “P” strategies expected to influence physical activity:
“Preparation,” “Promotions,” “Programs,” “Policy,” and “Physical Projects.” The comparative analysis addresses the following exploratory research questions:

1. What key lessons can inform future trail initiatives?
2. How might trail initiatives influence physical activity?
3. Can the 5P model serve as an implementation framework for trail initiatives?

This work is rooted in a socioecological tradition, which holds that physically active behavior results from complex interactions among multiple levels of influence, including individual, interpersonal, organizational, community, policy and social factors (McLeroy, Bibeau, Steckler, & Glanz, 1998). Exploring two trail initiatives from a socioecological perspective may provide a better understanding of community trail initiatives’ potential to influence physical activity. It is hoped that findings and lessons from this study can inform best practices for future trail initiatives as well as raise questions to be addressed through additional research.
LITERATURE REVIEW

Approaches to Increasing Population Physical Activity

The pervasiveness of physical inactivity and its links to obesity and a host of chronic diseases are well established in the United States. Physical activity decreases the risks of overweight and obesity, heart disease, diabetes, certain cancers, hypertension, and enhances mental health (USDHHS, 1996). Yet, public health surveillance data indicate that a majority of individuals do not meet the U.S. Surgeon General’s recommendation of 30 minutes of moderate physical activity 5 or more days per week, or 20 minutes of vigorous physical activity for 3 or more days per week. In 1996 and 2000, for example, surveys showed insufficient activity among 80% of the population (using only the former criteria of 30+ minutes for 5+ days per week). Subsequent modification to surveillance survey questions also captured those who met physical activity requirements through vigorous activity, but still found over half of the adult population insufficiently active to accrue the health benefits associated with physical activity (Table 1, below) (Centers for Disease Control and Prevention, Behavioral Risk Factor Surveillance System [CDC, BRFSS]). In addition to high population levels of physical inactivity, persistent disparities exist among vulnerable populations, including individuals of low socioeconomic status and ethnic minorities (Kruger & Kohl, 2007). The data show the importance of increasing the rates of physical activity across all segments of the population as an important public health objective.

Table 1

Population Rates of Physical Inactivity, 1996 – 2005

<table>
<thead>
<tr>
<th></th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2005</th>
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<tbody>
<tr>
<td>Insufficient PA (pre-2000 definition)</td>
<td>79%</td>
<td>78%</td>
<td></td>
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The national public health agenda has included physical activity promotion for some time, but population-based obesity trends have captured significant attention due to increases in recent decades. In 1996, 35% and 17% of the population was overweight and obese, respectively. These numbers rose to 37% and 24% in 2005 (Table 2) (CDC, BRFSS). Clinical measurements provide more troubling statistics, indicating that at least 64 and 31% of adults are overweight and obese, respectively (Flegal, Carroll, Ogden, & Johnson, 2002). These numbers represent a dramatic population increase since the mid nineteen-seventies, when obesity rates were estimated at only 15% (CDC, n.d.). The modern “obesity epidemic” has further spurred the public health field to identify and address the root causes of physical inactivity.

Table 2

Population Rates of Overweight and Obesity, 1996 – 2005

<table>
<thead>
<tr>
<th></th>
<th>1996</th>
<th>2000</th>
<th>2001</th>
<th>2005</th>
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</thead>
<tbody>
<tr>
<td>Percent Overweight</td>
<td>35.4%</td>
<td>36.7%</td>
<td>37.2%</td>
<td>36.7%</td>
</tr>
<tr>
<td>Percent Obese</td>
<td>16.8%</td>
<td>20.1%</td>
<td>21.1%</td>
<td>24.4%</td>
</tr>
<tr>
<td>Total percent overweight + obese</td>
<td>52.2%</td>
<td>56.8%</td>
<td>58.3%</td>
<td>61.1%</td>
</tr>
</tbody>
</table>

Between 1995 and 1996, landmark reports from the Centers for Disease Control and the American College of Sports Medicine, as well as the U.S. Surgeon General, raised alarm about high rates of physical inactivity. Part of a broad effort to summarize and disseminate the most current findings on physical activity, the reports emphasized the ability to accrue
significant health benefits from frequent bouts of moderate physical activity (i.e., 30 minutes, 5 times per week) (Pate, Pratt, & Blair, 1995; USDHHS, 1996). This stood in contrast to a previous body of research and cultural thinking around physical activity that emphasized the importance of less frequent intervals of intense exercise (i.e., 20 minutes, 3 times per week) (USDHHS, 1999). The report generated momentum to shift attention towards walking and bicycling, both common and popular forms of physical activity for the majority of the population (Eyler, Brownson, Bacak & Housemann, 2003; Pucher & Renne, 2003; League of American Bicyclists, 2008).

Public health efforts to increase physical activity traditionally encouraged individuals to meet activity recommendations though leisure-time pursuits, but ignored many broader influences on behavior. Common efforts included awareness campaigns and structured opportunities to engage in group physical activity (Kahn et al., 2002). Studies confirmed that structured routine opportunities, such as pedometer walking programs, increase participants’ physical activity levels but failed to address long-term sustainability of behavioral change (Ogilvie et al., 2007; Richardson et al., 2008). Such evidence fueled the realization that physical activity promotion extends beyond leisure-time activities or even the public health field. Other disciplines, especially transportation and land use planning and parks and recreation, also sought to encourage walking and bicycling. Through the urban planning perspective, utilitarian activity provided additional opportunities to pursue physical activity encouragement.

Emerging Multidisciplinary Perspectives in Physical Activity Promotion

Many urban planning professionals see opportunities to increase the share of walking or bicycling trips and thereby reduce the percentage of automobile travel (Hoehner et al.,
2003; Saelens, Sallis & Frank, 2003). Although 41% of trips originate within a bikeable 2 miles of their destinations, and 28% fall within a walkable 1 mile, 89 and 66% of these trips, respectively, occur via automobile. (Pucher & Renne, 2003). Destinations may also impact mode choice. Recent National Personal Transportation Survey (NPTS) estimates indicate that walking and bicycling occur most frequently on trips to school and church, and for recreation and socialization, rather than to places of employment or retail shopping. Such evidence demonstrates the latent potential to increase active travel mode shares (Pucher & Renne, 2003).

Broad factors, including land use and transportation policies that support automobile travel almost exclusively, may influence the lack of progress in increasing non-motorized trips (Duany, Plater-Zyberk, & Speck, 2000). The lack of feasible non-motorized transportation routes may stem from policies that require separation of housing from civic and commercial destinations and robust support for interstate and road system for motor vehicles. As a result, community and regional walking and bicycling trips are often unsafe, unattractive or inconvenient due to long distances between destinations (Duany et al., 2000; Frank, Engelke, & Schmid, 2003). Design characteristics at the neighborhood level may also influence active travel, since infrastructure often excludes facilities like sidewalks, bicycle lanes or trails that make walking and bicycling safe and inviting (Saelens et al., 2003; Addy et al., 2004). Indeed, those who bicycle in the U.S. face much greater risk of death or injury compared to cyclists in several European countries with more a bicycle-friendly infrastructure (Pucher & Dijkstra, 2003). The desire to increase rates of utilitarian travel and physical activity therefore conflicts with the absence of environments that support such behavior.
Research supports the presence of a relationship between physical activity and supportive policies and environments, although most studies are cross-sectional in nature and unable to establish a causal link (Committee on Physical Activity, Health, Transportation, and Land Use, 2005). Literature reviews of interventions to promote physical activity provide additional support for environmental and policy change as a means to increase physical activity (Task Force on Community Preventive Services, 2002; Brownson, Haire-Joshu, & Luke, 2006). The CDC’s Community Guide to Preventive Services now strongly recommends interventions that provide access to places for physical activity in combination with informational outreach, in addition to those that address street-scale and community-wide land use policies to facilitate activity-friendly environments (Centers for Disease Control [CDC], 2008). Evidence is insufficient to recommend interventions that support policies related to transportation and travel, the topic is identified as a critical area for future research. Overall, such research supports the notion that collaborative efforts between public health, planning, and related disciplines may bring about policies and environments that facilitate more physically active, less auto-dependent lifestyles.

National initiatives encourage practitioners, particularly in public health, to address the policy and environmental determinants of physical activity. The Centers for Disease Control (CDC) developed the “Active Community Environments” (ACES) initiative to disseminate information and encourage communities to implement policy and environmental interventions to promote physical activity (Aytur, Rodriguez, Evenson, Catellier, & Rosamond, 2007). Similarly, the Robert Wood Johnson Foundation (RWJF) established an “Active Living” initiative that aims to build physical activity into daily routines, and the WK Kellogg Foundation initiated a “Food and Fitness” program with similar objectives around
both physical activity and healthy eating (Isaacs & Colby, 2008; W.K. Kellogg Foundation (n.d.). Such initiatives have further prioritized policy and environmental change among research and community demonstration projects that aim to foster healthy lifestyles.

*Trails and Greenways as Places for Physical Activity*

Multi-use trails provide access to recreational and utilitarian physical activity in a variety of settings and have therefore been suggested as a means to increase physical activity (Brownson et al., 2006). Greenways and trails have historically been thought to enhance quality of life within communities, and their origins lie within the Olmsteadian planning tradition and the City Beautiful movement (Little, 1995). Olmstead himself may have dubbed them “linear parkways,” and conceived of greenways as vital connections between parks, neighborhoods, and other parks, even before the advent of the mass-produced automobile (Little, 1995). The modern greenway movement started in response to the need to protect environmental systems, especially watersheds. They may also foster social equity in access to recreation and transportation facilities and contribute to local economies (Lindsay, 2003). Greenways are often viewed as a public good to not only meet communities’ needs for both recreation and alternative transportation, but also promote balanced patterns of growth (Connie et al., 2004). The potential therefore exists to include a diverse group of stakeholders with interests in activities such as trail and greenway advocacy, policy and promotion.

*Associations Between Trails and Physical Activity*

Studies indicate an association between trails and physical activity, although the strongest evidence comes from the least-rigorous body of cross-sectional research that is unable to determine causality. In several retrospective cross-sectional studies using intercept interviews of trail users, users typically reported increased levels of physical activity
following trail construction. In the UK, for example, after the implementation of an extensive national trail system, data from a large sample (n=7300) indicated subsequent increases in physical activity among trail users. Forty-two percent reported a “large” increase as a result of the trail network, while 28% reported a “small” increase (Lawlor et al., 2003). Similarly, in Indiana, 70 to 87% of trail users across six different statewide trail systems reported increased levels of physical activity as a result of their local trail’s presence (Eppley Institute for Parks and Public Lands, 2001). Brownson and colleagues (2000) conducted a telephone survey in a rural Missouri study area, and found that of the 38.8% of respondents that had used trails for walking, 55.2% of those had increased their level of physical activity since they began using the trail. Moreover, more self-identified non-regular walkers reported that the trail had led to increased walking compared to those who were already regular walkers. The authors speculated that even though trails may not lead regular walkers to increase their levels of physical activity, the presence of trails may spur inactive individuals into higher levels of activity.

Other cross-sectional studies also indicate a connection between residential proximity to community trails and engaging in physical activity. A multi-county population survey regarding leisure-time physical activity among North Carolina adults found greater likelihood of meeting physical activity recommendations among residents living near a neighborhood trail or a place for physical activity. Thirty-one percent of those living near a trail met the recommended level of physical activity, versus 24% of those not living near a trail, a statistically significant difference even after adjusting for sociodemographic and environmental factors (Huston, Evenson, Bors, & Gizlice, 2003). Similarly, proximity to a trail correlated to trail use itself in the study of a Massachusetts bikeway (Troped et al.,
2001), while Powell, Martin and Chowdhury (2003) found that individuals within a 10 minute walk to a specific walking place (walking trails among the places reported) were more likely to report being physically active.

Although trails may encourage physical activity, several studies found relatively low community member awareness of trails’ existence. Only 24.5% of residents knew about nearby trails in a Missouri study (Brownson et al., 2000), while 56% of residents in a South Carolina county with an “abundance of recreational trails” were actually aware of the trails’ existence (Reed, Ainsworth, Wilson, Mixon, & Cook, 2004, p. 906). About one-third of those who were aware of the trails reported using them. As with other cross-sectional studies, self-reported trail users were more likely to be physically active than non-trail users, leading the authors to recommend more marketing campaigns to help increase residents’ awareness of community trails (Reed et al., 2004).

While the above results support a link between trails and physical activity, the cross-section design inhibits the ability to make causal inferences about the relationship. Researchers therefore encourage “opportunistic” quasi-experimental studies that examine physical activity before and after trail construction (Bauman, 2005; Hoehner et al., 2003; Moudon & Lee, 2003). More rigorous evidence of trail effectiveness in encouraging physical activity could bolster the case for making trails and trail systems higher public policy and funding priorities (Cohen, Sehgal, Williamson, Golinelli, & Lurie, 2008; Wang et al., 2004). To date, only four such prospective studies have examined physical activity before and after the construction of new community trails, but results have been mixed and inconclusive so far.
One recent prospective study of a new bicycle path adjacent to a bus way in Los Angeles indicates that new trail facilities generate use. The trail connected to an existing trail in one neighborhood, and in a higher-density, mixed use location three miles away, it upgraded an existing bicycle lane (a painted lane to separate bicycles from cars on the road). Post-implementation observations in the two aforementioned locations showed a 38% increase in pedestrian and bicycle activity. Results varied by trail and neighborhood characteristics, however. Walking and bicycling increased during commuting hours rather than weekends, indicating an increase in utilitarian activity along the bus way. Secondly, increases in walking versus bicycling varied by location. Bicycling increases occurred near first location where the trail increased connectivity, while walking increases occurred in the dense, mixed-use location. Although the study detects promising increases in physical activity and confirms evidence about environments that support walking and bicycling, researchers did not measure total trail use counts via electronic devices, nor did they conduct population-based surveys to determine if rates of physical activity had increased in the community after installation of the bicycle trail (Cohen et al., 2008).

Population samples of physical activity near new trails show less-compelling evidence for the link between trails and physical activity. In one study, researchers examined self-reported measures of physical activity before and after installation of a new trail segment in Durham, North Carolina. They found no differences in leisure time, vigorous, or transportation related physical activity among residents who lived within 2 miles of the segment after it was constructed. Sixty-five percent of respondents said they had never used the trail, 17% had used the trail but felt it had not increased their level of physical activity, and only 5% felt the trail had resulted in physical activity increases. Possibly confounding
the study, the authors noted that the new segment was a continuation of an existing trail, and that a greater percentage of residents reported the presence of existing places to be active (i.e., sidewalks and trails) compared to statewide measures. The authors recommend that additional prospective studies continue to measure the impacts of trails in a diverse range of settings (Evenson, Herring, & Huston, 2005).

Two prospective studies have examined physical activity outcomes of promotional activities associated with newly-opened trails. These results showed some increases trail use, but like Evenson and colleagues (2005), found little support for population-level increases in physical activity. Researchers studying a trail in Australia saw increases in the prevalence of bicycling counts following the opening of a trail and a concurrent media promotional campaign. A telephone survey 3 months after the campaign revealed that only cyclists who lived near the trail reported increased trail awareness and time spent walking or cycling. Moreover, the study found no population increases in average time spent walking and biking (Merom, Bauman, Vita, & Close, 2003). Brownson and colleagues (2004) found that walking increased after trail construction in six rural Missouri communities compared to six similar comparison communities without trails, but again, detected no population-wide increases in physical activity. The authors noted that time and budget constraints limited implementation of a trail promotion intervention, which may have limited trail awareness and use.

Overall, evidence from natural experiments of trails presents a less-compelling picture of the relationship between trails and physical activity compared to cross sectional study evidence. Additional prospective studies may clarify the relationship. Merom and colleagues (2003) advocate for longitudinal research to capture the long-term impacts of trail systems; newly built trails, they note, may generate more pronounced increases in physical
activity over time, after the trail is established in the community. Additionally, methodological improvements in measuring physical activity may strengthen the evidence base, given the current reliance on self-reported physical activity to detect trail use or population increases in physical activity (Evenson et al., 2005). Even though most studies used reliable and validated self-report measurement scales, few cross-sectional or prospective studies used objective measurement of physical activity levels. Measurement devices such as accelerometers or motion sensors may improve future studies, but increased time and expense often prevents their use (Evenson et al., 2005).

Researchers and practitioners are cautioned, however, against using methodological improvements as the sole means to advance trails and physical activity research. Bauman (2005) notes that more sophisticated measures may simply confirm cross sectional studies rather than identify and test promising interventions. Research may never detect changes in physical activity, she argues, without broader, “whole community” changes that shape systems and attitudes related to active community environments. The limited changes in population-wide physical activity found by prospective studies may indicate a ceiling effect whereby trails only shift the location of physical activity among previously active individuals. A similar effect may occur if, as research indicates, individuals self-select into communities based on the presence of amenities such as trails (Librett, Yore, & Schmid, 2003). Furthermore, evidence from trails research indicates additional influences on trail use, including demographics, neighborhood characteristics, and trail design. Based on such complexities, studies that describe the conditions in which trails most successfully increase population physical activity should inform future trail initiatives.
In terms of demographic influences, trail use was associated with being younger, more educated, and having higher income (Lindsey, Han, Wilson, & Yang, 2006; Troped et al., 2001; Reed et al., 2004; Brownson et al., 2000), although Brownson and colleagues (2000) found that women and individuals of lower socioeconomic status were more likely to increase their levels of physical activity due to trail use. Gender varied in its influence, however. Females were more likely than males to use walking trails, particularly in studies of rural areas (Brownson et al, 2000; Reed et al., 2003), but males were more likely to use bicycle-oriented trails (Troped et al. 2001; Lawlor et al., 2003; Merom et al., 2003). On the other hand, trails may encourage female bicyclists. One study showed that female commuter cyclists greatly preferred off-road paths compared to roads without bicycle facilities (Garrard, Rose & Lo, 2008).

Neighborhood context influenced trail use in several studies. Trail use was associated with neighborhood income, population density, amount of neighborhood commercial use, and mean street length in one study (Lindsey et al., 2006). Similarly, residents in Massachusetts who described their community as only “residential” were half as likely to use the bikeway compared to those who identified their community as “mixed residential/commercial,” or “commercial” (Troped et al, 2001). In the same study, residents who reported having to cross a busy street or intersection were less likely to use the community bikeway.

Additional studies addressed trail design characteristics associated with trail use. One analysis used GIS and aerial remote sensing technology to identify trail ‘viewsheds’ that correlated to trail use. Viewsheds with more greenery than the surrounding neighborhood, with a higher mix of land uses surrounding the trail, and those with more open views were
associated with physical activity (Lindsey, Wilson, Yang, & Alexa, 2008). Similarly, Lindsey and colleagues (2006) found a positive association between trail use and the health of plant life surrounding an urban trail, while Brownson and colleagues (2000) found a link between scenic beauty and trail use. Trail design may also address environmental barriers to trail use. Longer block length was associated with increase trail use, indicating that fewer street crossings may make trails more inviting (Lindsey et al., 2008). Trail surface material also impacted trail use. Asphalt trails generated more use compared to trails constructed of other surface materials, such as gravel (Brownson et al., 2000). Finally, Troped and colleagues (2001) found an inverse association between trail use and distance from the trail as well as presence of steep hills, leading the authors to conclude that such barriers on or around trails should be considered during trail design.

**Trail Initiative Implementation**

Despite the potential benefits of building community trails, relatively little research in the public health or community planning literature examines the process of trail planning and implementation as a means to increase physical activity. An analysis of six trails identified significant policy factors that influenced the process of successful trail development (Eyler et al., 2008), while an analysis of six trails in rural Missouri communities examined key lessons in trail building and trail use encouragement (Wiggs, Brownson, & Baker, 2006). In addition, Flink, Olka, and Searns’ (2001) text provides normative guidance on the process of community organization, trail design and engineering considerations, and effective trail promotion. Together, these resources uncover several themes to inform trail development in other communities.
Trail development takes long-term commitment and persistence, since the projects are complex and often last for years. For this reason, local “champions” and key stakeholders groups often led successful trail initiatives, allowing the formation of common interests and goals among diverse groups. Additionally, community engagement and needs assessment contributed to trail development. Focus groups among key stakeholders and community members uncovered the need to provide more local places for physical activity and generated a constituency of support for trails (Eyler et al., 2008; Wiggs et al., 2006).

The stakeholder engagement emerged as an important preliminary step in helping communities to navigate the technical and political complexities of trail development (Flink et al., 2001). Wiggs and colleagues (2006) noted the importance of taking time to engage stakeholders in a process of identifying their common goals in order to facilitate productive partnerships and promote community “ownership” over critical future processes such as trail maintenance. Eyler and colleagues (2008) also noted that strong collaborative partnerships could help communities to overcome policy barriers such as trail design standards, safety standards, environmental protection practices, operational policies (e.g., trail maintenance), and funding policies that often causes extended negotiations and delays.

A variety of local policies also helped communities to ensure successful trail development, especially given the length of time and complexity of the process. Supportive policies – including trail master plans, funding, land acquisition, liability, and inter-agency agreements – facilitated community trails and helped to avoid later conflicts. The presence of supportive champions and stakeholder involvement also facilitated the implementation of supportive trail policies (Eyler et al., 2008).
Finally, Wiggs and colleagues (2006) addressed trail promotion processes in their study. The authors described communication and social support efforts associated with the trail (e.g., newsletters, walking clubs, and community-wide events), and found that promotional activities augmented the impact of the trail on physical activity. Flink and colleagues (2001) also described several methods for trail promotion, including emphasis of a trail’s unique local features, publicizing the trail before completion, holding “name the trail” contests, trail workdays, opening day “kick off” events, on-going walking or bicycling events, and working with local media.

Trail implementation frameworks: a missing link

Although findings from studies of trails and physical activity demonstrate the need for more evidence to determine how, when, and why multi-use trails affect physical activity, contextual and demographic influences associated with trail use already help to inform trail initiatives. Still absent, however, is a unifying framework, or implementation model, that practitioners could use in order to apply the best known practices to each local situation. The lack of implementation models may limit the effectiveness of trail initiatives and other policy and environmental efforts to increase physical activity. Dunn and Blair (2002) pointedly comment that “the models to guide translation of the recommended physical activity interventions from research to practices are not as well-defined as models for basic and applied research” (p. 8). Advocates for improved environmental support for physical activity note that the state of research will likely not advance until more practice-based evidence is brought to bear on future interventions (Bauman, 2005). Yet, the lack of a solid implementation framework could stymie efforts towards both ends.
The socioecological tradition provides a well-established framework within the field of physical activity promotion. The framework posits that behavior change is more likely to occur in the presence of multiple “levels” of influence, including individual, interpersonal, organizational, community, policy, and society determinants (McLeroy et al., 1988). Although the framework explains the complex behavioral determinants of physical activity and justifies the need for policy and environmental interventions, it lacks practical guidance in coordinating multi-strategy intervention activities (Sallis et al., 2006; Lee & Moudon, 2006). A conceptual framework rooted in the socioecological model, but geared towards implementation, may provide a needed tool to strengthen physical activity initiatives.
CONCEPTUAL FRAMEWORK

The Active Living by Design “5P Model”

To bridge the gap between research and practice, the Active Living by Design “5P Community Action Model” may provide an effective implementation model for policy and environmentally-focused initiatives and encourage integration among other socioecologic influences. A recent study used the 5P model as a framework to evaluate the implementation of Active Transport to School initiatives at two different North Carolina schools, and found that differences in the presence and quality of the P strategies helped to explain different levels of success between the two sites (Fesperman, Evenson, Rodriguez, & Salvesen, 2008). Although the current study deems both trails successful by the fact each has been constructed, it also looks at differences in the strengths and weaknesses in the P strategies to uncover key lessons that could inform future trail initiatives. This case comparison also examines the suitability of the 5P model as an implementation framework for other community trail projects.

Increased awareness of multi-level interventions to counteract inactivity and obesity corresponds with the rise of the previously-described Active Living movement. Active Living represents a paradigm shift in national and community leaders’ approaches to addressing physical inactivity. Active Living by Design, a national program of the Robert Wood Johnson Foundation, works with community demonstration projects to increase routine physical activity through community design (Isaacs & Colby, 2008).

Colleagues at Active Living by Design developed the “5P Model” to aid communities in their work. Supported by the socioecological framework, the model specifies five strategies to direct implementation activities, including “Preparation,” “Promotion,”
“Programs,” “Policy” and “Physical Projects.” The 5P Model hypothesizes that the Ps are more effective in promoting physical activity when the strategies are integrated, or used together, rather than in isolation, to target a particular location or population (Active Living by Design [ALbD], n.d.). The “Active Living by Design Community Action Model” encompasses the 5P model itself, shown in Figure 1, below, and followed by a discussion of each of the “P” strategies. When “upstream” supports in the community, such as community resources and key stakeholders apply the 5P strategies to a particular project or issue, the model hypothesizes that positive “downstream” changes will occur. Used together, the 5P strategies may produce conditions in which a community can be active, ultimately addressing behavioral and health outcomes (ALbD).

![Figure 1. The Active Living by Design Community Action Model. The “5P” strategies are shown in the second column from the left.](image)

**Preparation.**

Preparation strategies help to lay the foundation for community-wide action, both at the beginning and throughout the course of a community-based initiative. Activities often include convening and maintaining an effective partnership of stakeholders; assessing target audiences and local conditions to understand the factors that might facilitate or inhibit
physical activity, training local staff and advocates, and securing resources to support and sustain a local initiative (ALbD, n.d.). The increasingly multidisciplinary nature of policy and environmental interventions requires stakeholder collaboration in ways that often differ from previous experiences, making preparation strategies critical throughout an initiative (Corburn, 2004; Fenton, 2005; Henderson et al., 2001; Hoehner et al., 2003; Litman, 2003).

A key element of preparation involves the coordination of diverse partners. In the study of six community trails, local government and/or community or advocacy groups often led trail projects and coordinated the efforts of diverse community partners and outside agencies – for example, by working with state agencies or coordinating federal funding mechanisms. Local trail “champions,” or highly supportive and engaged individuals, often played key roles in successful preparation. Partners often included stakeholders from community or governmental organizations. Leaders not only brought partners together, but also used consensus-building communication to help stakeholders focus on common interests in order to maintain collaboration and mitigate conflict (Eyler et al., 2008).

Proactive communication and stakeholder engagement may also prevent conflicts and thereby improve intervention outcomes. In the study that compared two ‘active transport to school’ initiatives, the school that initially engaged key stakeholders gained buy-in from groups essential to the project’s success, especially parents and teachers. With the cooperation and support of such constituencies, the school addressed barriers and concerns, ultimately encouraging more parents and children to walk and bicycle to school (Fesperman et al., 2008).

Understanding an audience’s needs, as highlighted above, is likely critical in order to successfully encourage trail use. In a participatory study, community members identified the
barriers and potential solutions that would increase their likelihood of using a community trail (Kelly, Baker, Brownson, & Schootman, 2007). The community forum uncovered differences in safety perceptions among different groups: women and upper-income users expressed a greater likelihood of trail use if they knew their neighborhoods and knew that others were looking out for them, while adults of lower income reported a lack of trust for law enforcement officers. By listening to potential trail users, implementers learned that increased police presence would not necessarily increase trail use. Community members themselves identified potential solutions to address their safety concerns, such as communication and trust-building activities between law enforcement and community groups. These differences, while subtle, reinforce the importance of engaging in assessments and proactive communication with target audiences in order to maximize the potential of any project to affect behavior change.

Promotions.

Promotional messages and materials can increase awareness of the benefits of physical activity and encourage individuals to meet recommended levels of activity. Promotions should also support the other P strategies. They often raise awareness about places in which to be active or structured physical activity programs. Effectively targeted promotions can also educate and build support for initiatives that involve policy and environmental change among a community’s key stakeholders, and can be particularly helpful in efforts to advocate for active community environments (ALbD, n.d.).

Promotions strongly recommended in the literature include point-of-decision prompts (strategically placed signs that remind people to use the stairs, for example), mass media communications using television, radio, billboards, informational mailings, special events or
other similar techniques that are also combined with other types of intervention components such as programs, policies, or environmental change (Kahn et al., 2002). Similarly, walking trail promotions seem to increase trail use, but studies note the need to use tailored messages in order to increase awareness among different target audiences (Brownson et al., 2005; Reed et al., 2004; Merom et al., 2003).

Similarly, the social marketing field emphasizes the effectiveness of tailored messages in prompting behavior change. Sophisticated promotions segment audiences according to salient characteristics (e.g., gender, age, ethnic group, etc.), increasing the likelihood that messages will resonate with particular audiences and produce the desired outcomes (Andreasen, 1995). Regarding trail use, several studies identify barriers that vary by demographic groups (Kelly et al., 2007; Troped et al., 2001; Reed et al., 2004; Brownson et al., 2000; Lindsey et al., 2006). Effective promotions would likely take such information into account and tailor communication efforts to reach particular target audiences.

Additionally, communications that aim only to raise awareness of trails may be insufficient to generate trail use among many. Health promotion practice emphasizes the importance of connecting health behavior change with underlying motivations, factors often related to quality-of-life rather than health (Green & Kreuter, 2005). For instance, one study of trail users identified multiple determinants of trail use, including trail amenities (e.g., local history, physical amenities, and scenery), intrinsic benefits (e.g., enjoyment of nature or a sense of autonomy), and values (e.g., fulfilling a sense of excitement, accomplishment or belonging) (Frauman & Cunningham, 2001). Understanding and tapping into individuals’ deeper motivations can powerfully impact promotional strategies.

*Programs.*
Health-related programs involve structured, on-going activities that directly or indirectly involve individuals in physical activity, for example, pedometer programs, walking and bicycling clubs, support groups, or educational sessions. An incentive component is commonly used to keep participants motivated to reach certain levels of physical activity (ALbD, n.d.). The Task Force on Community Preventive Services’ (2002) review found strong evidence to support individually-adapted behavior change programs that build skills and increase social support for physical activity.

As with promotional activities, several studies have found that structured programs can heighten the use of a trail (Bjärås, Klinge Härberg, Sydhoff, & Ostenson, 1999; Brownson et al., 2005; Brownson et al., 2000). Individually-oriented programs are also critiqued, however, because there is insufficient evidence to show that programs lead to sustainable long-term increases in physical activity (Ogilvie et al., 2007; Richardson et al., 2008). For this reason, programmatic elements of an initiative may be more effective when combined with environmental supports. Indeed, evidence shows that programmatic and environmental project elements can work synergistically, since most of the evidence in support of the effectiveness of creating “access to places for physical activity” is based on studies of interventions that also combined programmatic and promotional elements (Task Force on Community Preventive Services, 2002).

Likewise, program-oriented interventions show stronger results when policies and environments support walking and bicycling. One intervention, for example, promoted walking and bicycling to work among employees in three workplaces. Participants in the walking intervention group were almost twice as likely to walk to work compared to those in the control group, but those in the bicycling intervention were no more likely to cycle.
compared to the control group. According to the researchers, a physical transportation network that supported walkers (i.e., via sidewalks), but not bicyclists (i.e., lack of greenways and bicycle lanes) contributed to the observed differences between walkers and bicyclists in the intervention (Mutrie et al., 2002).

Policy.

Policies offer mechanisms by which to influence institutional and organizational standards of practice through supportive regulations and guidelines, often involving public processes. Crucial steps in the policy-making process include educating and building relationships with key decision-makers and building grassroots support (ALbD, n.d.). Policy change underlies some of the most effective public health interventions in prompting widespread impact of behavioral and cultural norms; for example, with sweeping indoor air and tobacco tax policies to curtail tobacco use, and safety belt laws to prevent unnecessary injury and death in automobile accidents (Brownson, Royer, Ewing, & McBride, 2006). For this reason, policy change likely holds promise as a means to address physical activity and obesity.

The power of policy lies in its predicted ability to shape physical or social environments in ways that facilitate physical activity. In terms of the built environment, a number of policies may increase the feasibility for walking and bicycling, especially as a means of transportation (Litman, 2003). These include zoning ordinances, guidelines related to siting school facilities, park or greenway master plans, or capital improvement programs to fund pedestrian and community bicycle infrastructure (Salvesen, Evenson, Rodriguez, & Brown, 2008). Research also supports the notion that the social environment impacts physical activity (Addy et al., 2004), although relevant policy solutions are less clear. A
recent study found that neighborhood characteristics, rather than individual levels of income, better predicted physical activity. Those who lived with higher rates of poverty, lower levels of education, and higher proportion of women-headed households were less likely to be physical active regardless of individual income (Wen, Browning, & Cagney, 2007). Findings from this study also suggested that strategies to increase perceptions of trust among neighbors and decrease perceptions of violence could improve physical activity levels, particularly among women. Finally, the built and social environments may be linked, as indicated by findings that residents of walkable neighborhoods had higher levels of social capital – social interactions leading to trust and reciprocity among community members – compared to residents of automobile-oriented communities (Leyden, 2003, pg. 1546). For these reasons, policy may make impact multiple, interconnected determinants of physical activity.

In addition to formal policies that facilitate activity-friendly environments, organizational behaviors and practices are critically important in shaping the success of policy change. Local practitioners’ abilities to understand, work within, and ultimately shape their communities’ organizational structures facilitate policy change (Librett et al., 2003). In other words, policies must be implemented, not just adopted, in order to impact the community. Salvesen and colleagues (2008) examined factors that contributed to successful implementation of physical activity-related policies. These included knowledge and awareness of the need for policies that influence physical activity; willingness and ability to implement policies, including sufficient technical knowledge and fiscal resources; presence of advocates within local government who have the authority to enact and/or implement policy as part of their professional roles, for example, a community planner that requests
sidewalks or greenway accommodations in a development site plan; institutionalized mechanisms for intergovernmental coordination, for example, allowing all relevant agencies to comment on plans for development; and finally, navigating conflicts that often arise from interactions between agencies with varying objectives and organizational cultures.

Despite an emerging understanding of the policy determinants suspected to impact physical activity, little research informs policy makers about the most effective or impactful policy changes to increase physical activity (Librett et al., 2003). Indeed, researchers typically fear that connecting their findings to policy implications or recommendations may exceed the scope of their work or even compromise scientific objectivity (Brownson et al., 2006). For this reason, perhaps, a much greater body of research focuses on the built environment elements that impact physical activity rather than policy change (Schmidt, Pratt, & Witmer, 2006).

Exploratory examinations of physical activity-related policies provide insight into the process of crafting effective policies within various settings and contexts. Some evidence indicates that policy change may be more effective when it influences or is influenced by other P strategies besides simply built environment factors. Fesperman and colleagues’ (2008) comparison of two active transport to school initiatives provides an apt example of integration between policy and promotions or communication strategies. The authors identified the need to communicate policy changes with key stakeholders ahead of implementation. One of the schools provided bussing for children within 1 mile of the newly constructed school until sidewalks completion. They then instituted a policy to eliminate bussing for children within the 1-mile walk zone in order to encourage active transit. The
policy angered parents, who saw it as a take-away. Rather than encourage their children to walk to school, parents fought to have bus service reinstated.

Another case study found that community visioning forums facilitated policy change. In this study, a community health center aimed not only to provide healthcare to individuals, but also work alongside community members to facilitate a healthier environment. Community members in this economically distressed, predominantly Latino neighborhood were concerned with the lack of quality jobs and poor environmental quality as a major barrier to physical activity and health. Many spent a great deal of time commuting to distant jobs. The visioning exercise resulted in a well-designed, walkable new development that would be placed on an industrial brownfield site. The initiative also resulted in the development of new sustainable design guidelines to help shape future growth in the rapidly-changing area, hopefully moving away from sprawling development that is suspected to hinder physical activity (McAvoy, Driscoll, & Gramling, 2004). Examples such as these illustrate the power of policy change when combined with community involvement and non-traditional partnerships; policy change can facilitate widespread changes in community development patterns in ways that can positively impact physical activity as well as other health determinants.

**Physical Projects.**

Physical projects refer to the types of environmental changes that can make physical activity more convenient, safe or routine (ALbD, n.d.). Characteristics of active community environments include connected street design that encourages walking, housing density, pubic transit, and pedestrian and bicycle facilities (Handy, Boarnet, Ewing, & Killingsworth, 2002). Overall, an extensive literature review of studies that compare high- versus low-
walkable neighborhoods found that on average, residents of high-walkable communities made twice as many walking trips (recreational and utilitarian) compared to those in low-walkable communities. Highly-walkable neighborhoods were defined as those with high population density, mixed land use, high connectivity, and adequate design features for walking and bicycling (Saelens et al., 2003).

Humpel and colleagues (2004) argue the importance of studying specific behavior outcomes of interest within the context of a socioecological intervention to promote physical activity. To that end, walking for transportation or utility is associated with different determinants than walking for recreation or leisure (Lee & Moudon, 2006). Their findings suggest that attention must be given to both sets of determinants when planning physical projects such as trails, since they have the greatest potential for success when used for both recreation and transportation purposes. Their study, conducted in an urban area, found that objectively measured residential density was the only variable associated with walking for both recreation and transportation. Presence of objectively measured utilitarian destinations (e.g., a grocery story, restaurant, post office, or bank) was positively associated and hills were negatively associated with walking for transportation, above the effects of sociodemographic and perceived environmental barriers. Other studies of walking for transportation found a positive association with between increased walking and being within a 20 minute walk of a park, trail, or retail store (King et al., 2003). In Lee and Moudon’s (2006) study, recreational walking was positively associated with the presence of longer sidewalks and hills. Interestingly, presence of recreational destinations was not associated with recreational walking. For these reasons, physical project strategies should consider
community context by conducting local assessments with different groups in order to determine the primary determinants of physical activity within a particular community.

5P Model Summary

The CDC (2008) Community Guide to Preventive Services calls for more research to determine if environmental change alone is enough to facilitate behavioral change. Many of the interventions studied by the Community Task Force (2002), however, were combined with community campaigns or social support programs, so it was not possible to isolate the effects of the environment. Such evidence supports the underlying notion of the 5P framework, which suggests that environmental and policy change, when combined with individual behavior change strategies, produces more successful outcomes compared to use of any strategy in isolation.

Despite the potential value of the 5P model as an implementation framework, it also presents limitations. First, the model’s depiction is not entirely consistent with its hypothesized use. Even though model was developed in order to implement policy and environmental change, the visual arrangement of the Ps does not emphasize policy or physical projects, potentially leading to confusion. Similarly, Active Living by Design emphasizes the need to integrate the P strategies so that they support one another, but the model again fails to represent the concept of integration in a visual manner. Such ambiguity could be clarified. Finally, the 5P model may overlook other factors facilitate policy and environmental change. For instance, several studies discussed the value of a local champion in facilitating policy adoption and implementation within local policy systems (Salvesen et al., 2008; Eyler et al., 2007; Wiggs et al., 2006). Because the 5P model is comprised of general categories, it may overlook other relevant concepts.
Using the 5P Model to evaluate the process of trail development may guide future multi-use trail projects. The framework may help communities to maximize the potential for success in a) constructing trails, a complex and lengthy process; and b) maximizing trail use and impact on population rates of physical activity. A useful implementation model may help practitioners coordinate best practices across ecological determinants, professional disciplines, and contributing agencies and departments within the community. Practical implementation models could also build the capacity of community trails research to detect significant outcomes of interest.
METHODS

Study Design

The study used a mixed-methods design, with a primary focus on qualitative data analysis, to compare two successfully-built greenway trails in the Southeastern United States. The North-South Corridor / American Tobacco Trail is located in Durham, a medium-sized city (population 209,009) in central North Carolina in the midst of a growing metropolitan region known as the Research Triangle area (US Census, 2006). Nearby cities include Raleigh, Cary, and Chapel Hill. The Waccamaw Neck Bikeway multi-use trail is located in small but rapidly growing costal Georgetown County, South Carolina (population 60,860). The community lies approximately 1 hour north of Charleston and 1 hour south of Myrtle Beach (US Census, 2006). Appendices A and B compare descriptive characteristics regarding each trail. This study was conducted under the approval of the Institutional Review Board at the University of North Carolina at Chapel Hill, North Carolina.

The trails in Durham and Georgetown County were both deemed successful because they have been built, well embraced by their communities, and supported by plans for continued expansion in accordance with community-approved master plans. Different levels of local government support characterized each site. In Durham, the local government administration fully supported and spearheaded efforts to build a trail system. In Georgetown County, the greenway system was conceptualized and coordinated through local grassroots efforts due to local government’s inability to fund trail projects. Differences in local government support provide an interesting comparative framework by which to examine the 5P strategies in each community’s trail initiative.
Figure 2. Study design logic model.

Case Selection

Site selection was based upon the compelling contrast of local government support for the trail initiative, as well as specific core similarities that allowed a comparison between the two trails. Core similarities in each case included:

- Presence of public-private collaboration
- Implementation of all of the 5P’s from the ALbD Community Action Model
- Presence of a continuous, off-road trail with some connections provided by alternate facilities (e.g., sidewalks, bicycle lanes, share-the-road)
- Accommodations for both transportation and recreational trail users

The maps in Figures 3 and 4, below, show the trail routes in each study community.
Figure 3. North-South Corridor and American Tobacco Trail, Durham, NC. Select surrounding land use and density also shown.
Figure 4. Map depicting the Waccamaw Neck Bikeway, Georgetown County, SC. Select surrounding land use and density also shown.
Despite the compelling comparisons between the two community’s trail initiatives, several noteworthy differences characterize the sites. The trail in Durham exists in a largely developed urban area. The master plan for the entire greenway system is large – over 118 miles of trail have been identified, reflecting the more dense urban location and the need to equitably serve all parts of the community. Moreover, the percentage of young and employed population is slightly above the national average (US Census, 2000). By contrast, the Georgetown County is a more suburban, tourist-oriented setting that is rapidly developing but still has large swaths of undeveloped land. Because of the geographic boundaries in the area, smaller population size and less-dense development, the entire trail master plan is much smaller, a total of 27 miles. The population also exceeds the national average of older and retiree population (US Census, 2000).

Overview of Community Trail Initiatives

North-South Corridor / American Tobacco Trail in Durham, North Carolina.

In the City of Durham, the idea to create a greenway system began in 1982, with the Public Works Department’s request for a greenway feasibility study. Two interested city council members created an initial report and recommendations. Their findings led to the 1983 establishment of the Durham Open Spaces and Trails Commission (DOST), an official commission of the local government tasked with creating both urban open space and trails. DOST is a volunteer-based group comprised of community members, advocates, professional city staff, and policy makers. Key stakeholders in Durham discussed DOST’s influence and leadership in guiding trail system development through the Master Greenway Plan, most recently updated in 2001. Additionally, DOST helped the city institutionalize greenway plans into Durham’s broader comprehensive growth plans, ordinances, and informal procedures.
and practices. Since the initiative began in 1985, approximately 20 total miles of the trail system have been constructed. The emergence of Durham’s urban trails initiative also reflected the influence of local environmental advocacy groups that aimed to preserve urban wetlands and stream buffers. For this reason, much of Durham’s existing and planned trail system occurs near stream corridors and floodplains; other sections incorporate former rail corridors.

The trail study site in Durham extends for 13 miles, encompassing portions of the city’s North-South Corridor and American Tobacco Trail (ATT). The North-South Corridor emerged as DOST’s top priority for the greenway system because of the desire to connect the northern and southern portions of the community and connect dense residential areas with parks and recreational facilities. The first segments of the North-South Corridor were constructed in 1985, and expanded upon incrementally. The corridor merges with the ATT, a rail-trail facility, in Downtown Durham.

*Waccamaw Neck Bikeway in Georgetown County, South Carolina.*

By contrast to the government-initiated trail system in Durham, two local residents became “champions,” or advocates, for a trail system in Georgetown County. The residents, Lynne Reed* and Susan Landon,* saw the need for safe non-motorized transportation options for its residents and visitors. Geographically, the area referred to as “The Neck” lies on a relatively narrow stretch of land between the Atlantic Ocean to the East and the Waccamaw River’s expansive tidal wetlands to the west. Highway 17, a busy state highway, provides the main connection among neighborhoods, towns, and places of interest such as beaches, parks, and local commercial centers. With the area’s flat terrain, tourism industry, pockets of lower-

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* Names have been changed
income population who lack access to automobiles, and several past fatal pedestrian and bicycle accidents along Highway 17, many residents wanted a trail to connect the area.

The trail champions leveraged several important advantages to build grassroots momentum in support of the Waccamaw Neck Bikeway. Lynne Reed, through a professional background in planning and community development finance, understood how to implement such a project. Susan Landon was a well-established and respected business owner with many connections in the community. They began to host meetings with community members who had expressed an interest in greenways and bicycling, and eventually developed a grassroots organization in support trail development which came to be called “Bike the Neck.” The group also connected with planning experts to formulate an initial strategy. They then approached the County Administrator, who liked the idea of a greenway but stressed the local government’s inability to support such a system financially. In order to bring a greenway to the area, the County Administrator insisted that Bike the Neck take responsibility all aspects of trail development.

Lynne Reed, the primary leader of Bike the Neck, that the group could lead the trail development process given three commitments from county government. First, they would serve as the fiduciary agent. This way, rather than apply for non-profit status, Bike the Neck could act as a county entity when applying for grants and financing and have the county manage all funds raised. Next, the county would assume liability for the trail. Finally, they would provide ongoing trail maintenance. The group studied other successful trail systems and gathered information about the advantages of trail systems, including the financial benefits of trails in resort communities, in order to gain the county’s support. They made several presentations to the County Council, convincing the members to unanimously support
the three conditions. Bike the Neck was then able to amass the support, technical assistance, and funding to implement the Waccamaw Neck Bikeway.

The trail study side in Georgetown County extends for 15 miles and currently links the small seaside towns of Murrells Inlet, North Litchfield, Litchfield Beach, and Pawleys Island. In Murrells Inlet, a 3-mile bicycle lane extends south on Business Highway 17, providing bicycle access to local residential and retail areas and a community park. The bicycle lanes connect to Huntington Beach State Park, a trail section dubbed Waccamaw Neck’s “Crown Jewel” due to the surrounding beauty of the area. The route continues south on quiet residential roads marked with wayfinding signage, and links to the trail adjacent to a golf resort. The path crosses Highway 17 at a stop light, and continues until to the edge of the golf resort property. A share-the-road segment, with visible signage, provides the link to Pawley’s Island, although the share-the-road will soon be replaced with an off-road trail facility. The final existing off-road segment in Pawley’s Island is characterized by many commercial and retail establishments and multiple driveway conflicts.

**Qualitative Data Collection and Analysis**

Qualitative data sources.

Qualitative data for this study were obtained with permission from previous studies led by the North Carolina Physical Activity Policy Research Network at The University of North Carolina at Chapel Hill and The Citadel in Charleston, South Carolina. The primary data source comes from in-depth interviews with multidisciplinary stakeholders who played or continue to play key roles in the development and ongoing use of the multiuse trails at each study site. A single interview guide (Appendix F) was used to conduct fourteen structured interviews (7 at each study site), which typically lasted about 1 hour. Two
interviewers conducted all interviews (interviews at each site were conducted by the same interviewer). Interviewees included individuals such as city/county staff in planning and parks and recreation departments, partnership group members, and pedestrian/bicycle advocates. Appendix C provides a general description of all interview participants. Confidentiality of study participants has been maintained by omitting interviewees’ specific roles or titles and changing the names of individual “champions” associated with trail development.

**Participant recruitment.**

Participants were recruited to participate voluntarily in previous studies due to their involvement with the process of trail development, and were initially identified by publicly available information (e.g., local government websites). A standard recruitment script was used to communicate with potential participants (Appendix D). All study participants were provided an IRB-approved fact sheet describing the research (Appendix E). Each gave verbal informed consent, rather than via a signed document, in order to ensure confidentiality. Participants were also asked to identify additional key informants who could be contacted for in-depth interviews.

**Data analysis.**

Interviews were audio-recorded and professionally transcribed. A codebook was developed in order to analyze the data and build themes across the interviews. Using the codebook, interviews were coded and checked by two researchers in order to build the dependability of findings (Ulin, Robinson, & Tolley, 2005). Atlas TI software was then used to conduct qualitative data analysis of all coded interviews. Data reduction was performed by searching for repetitive themes among the interview data associated with each code variable,
and then creating a matrix of key themes for further examination. Finally, interpretation of
the reduced data set was conducted by examining the themes in the context of the ALbD 5P
Community Action Model (Ulin et al., 2005). Additional reference materials (local planning
documents) were not coded, but were used to triangulate interview data during the data
interpretation process and further ensure the dependability of the findings.

**Quantitative Data Collection and Analysis**

Quantitative trail count data were collected for this study at both sites in collaboration
with a researcher at the Citadel in Charleston, SC, in order to augment the qualitative data
analysis with several objective observational measures. These measures were envisioned as a
way to uncover more nuanced comparison among the different sections of the trails for the
“Physical Project” component of the ALbD 5P Model. The following section was provided
by Jeff Davis (2008) and is included as background.

*Trail traffic count methodology.*

A series of user counts were conducted on the two community trail case study
locations in Durham, NC and Georgetown County, SC. Trail count equipment included four
infrared scanners and two hand-held traffic data collectors manufactured by Jamar™
Technologies. Data were collected in Durham, NC from October through November 2007.
This period included weekdays and weekends exhibiting peak seasonal use (i.e., temperate
fall weather coincided with inherent desire to enjoy the outdoors). Data collection for
Georgetown occurred in January and February 2008, a time less conducive to promoting
outdoor activities. This time period also coincided with the tourism off-season and reflects
lower trail use counts. Additional counts in both locations are planned in connection with
separate studies, but at the time of this study, only the limited data described were available.
However, meaningful insight to trail use within each trail is evident from the data collection and tabulations developed for the various count periods.

Traditional vehicular traffic engineering techniques were applied to trail user data collection methods: hourly, daily and average day totals were determined over a duration extending between one to two month periods. Traditional vehicular traffic data collection emphasizes an understanding of typical traffic conditions which reoccur on a daily weekday basis during morning and afternoon peak travel periods. Developing reasonable estimates is relatively straightforward because patterns generally account for home-to-work trips and do not vary dramatically. Conversely, trail user trips have a considerable recreational component. These trips vary widely based on weather, daylight and other social issues, making typical daily trail use more difficult to determine. Despite the challenges in estimating trail use patterns, meaningful tabulations can be developed with the use of specific methodologies for collecting trail user volumes, described as follows.

First, inventories of the physical trail networks in each location identified the surrounding built/natural environment and physical characteristics of each trail. Distinct segments were identified for data collection purposes based on criteria outlined in the Path Environment Audit Tool (PEAT), a reliable and validated instrument that used to assess physical characteristics of trails (Troped et al., 2006).

In Durham, PEAT criteria identified eleven segments, and four representative segments were chosen for collection of user count data. Chosen segments were concentrated on the rails-to-trails section known as the American Tobacco Trail (ATT), since the ATT receives the highest trail use in the Durham area and the counts would be expected to
produce the largest possible sample size. Count locations are identified in Appendix G, and include the following trail segments:

1. ATT at Dunhill Drive (southern most 2.3-mile segment of 6.4-mile rails-to-trails section, nearest to a parking lot and shopping center)
2. ATT at Riddle Road (middle 2.2-mile segment of 6.4-mile rails-to-trails section)
3. ATT at Blackburn Street (northern most 1.9-mile segment of 6.4-mile rails-to-trails section)
4. North-South Corridor at West Knox Street (0.8-mile trail segment)

In Georgetown County, PEAT criteria identified nine segments for data collection purposes. Because of limitations in time and availability of only two available infrared scanners in Gerogetown County, two representative segments were identified for collection of user count data. The selected locations are also based on constraints in the ability to place the infrared scanners. Count locations are identified in Appendix H and include the following trail segments:

1. WNB at Trace Dr. (southern most point of 2.9.-mi trail segment through the woods inside Huntington Beach State Park)
2. WNB along Wilbrook Blvd. (mid point of 1.4-mi. trail segment within road right-of-way along Litchfield golf resort)

Infrared scanners were placed in discrete locations adjacent to the trail as per the manufacturer’s specifications, typically affixed to a utility pole and near an intersection; where fast moving trail users, such as cyclists, would slow in speed, enhancing the likelihood of detection by the automated device. Problems with infrared counters have been well documented by others (Lindsey, Wilson, Rubchinskaya, Yang, & Ham, 2007). Based on
systematic observations, infrared scanners proved inaccurate in detecting fast moving trail
users, trail users in pairs or groups, slender or small trail users, or those on the opposite side
of the trail of from the counter location.

To address the potential for systematic bias, classification counts were manually
recorded using hand-held traffic data collectors at each site for approximate two hour
intervals. Data was collected during daytime hours at various infrared scanner count
locations in order to draw comparisons between the infrared and hand-held methods. The
manual counts were assumed to be true, and in all cases, the infrared scanners undercounted
the actual trail user volume by an average of 44%. Tabulations comparing the manually
collected data to the infrared scanner counts are summarized in Appendix I. Although
concerning, systematic evaluation of this error allowed for calibration factors for use in
converting infrared scanner values into actual trail user count estimates. Once calibration
factors were determined, infrared scanner values were adjusted on an hour-by-hour basis.
This is similar to adjustment factor methods used for motor vehicular traffic in widely used
traffic engineering techniques.
RESULTS

The results section is organized by “P” strategy, and provides a comparative description of the ways in which Durham and Georgetown County’s trail initiatives used each strategy. Additionally, the ‘Physical Projects’ section describes the trail use counts observed across different segments of each trail.

Preparation

Preparation provides the basis for action in a community-based initiative by bringing together key professionals, citizens, and organizations, securing sufficient funding, and understanding the current needs and conditions in a community to ensure that the actions succeed within the local context. The complexity, expense, and long-term nature of greenway implementation necessitated sophisticated preparation strategies, which were crucial to the success of both initiatives. As a stakeholder in Durham stated,

“A lot of people don’t realize that building greenways is like a small road…any time you do a linear project it automatically becomes more complex than…building on one piece of property.”

Robust preparation activities characterized the physical development and upkeep of trails in both Durham and Georgetown County, likely due to the complex tasks involved in the trails’ physical implementation. Key trail development steps included greenway master planning, route identification, land acquisition, funding acquisition, trail design and planning for maintenance. The implementation process required coordination and cooperation among multiple stakeholders and agencies, but the approach used by each partnership differed due to the government- versus grassroots-led nature of each community’s initiative. Each community’s preparation strategies are described below, and summarized in Table 3.

Impetus and leadership for trail initiative.
In the City of Durham, the Durham Open Space and Trails Commission (DOST) guided and led trail development. Created by City Council as an official advisory board to local government, DOST was granted legal authority to operate based on an interlocal agreement. The group meets monthly, hosting formal meetings in hearing rooms at City Hall. Commission members are directly involved in identifying trail priorities and facilitating the development process. They walk potential trail corridors to identify appropriate routes, meet with neighbors to talk about trails, and support the role of the local government agencies that devote professional time greenway system development. Local government departments and staff serve in an implementation role. The planning and parks and recreation departments, in particular, accomplish the technical tasks necessary to implement a greenway plan. Besides the construction of the North-South/ATT Corridor, DOST and city staff also oversee implementation of the city’s entire 105-mile Greenway Masterplan as well as a separate Open Space Master Plan.

The Waccamaw Neck Bikeway in Georgetown County was initiated by two community champions, who created the grassroots Bike the Neck advocacy group in 1994. The group functions solely to ensure completion of the 27-mile Waccamaw Neck Bikeway master plan. Even though the County Administrator favored the greenway concept when approached, the Georgetown County Council was unable to commit the funding necessary to create a greenway system. Local government’s agreement to serve as a fiduciary agent to Bike the Neck and provide trail maintenance made it possible for the group to pursue their work, but the local government’s hands-off approach required Bike the Neck to seek outside resources and expertise to develop the trail. Thus, the effort started and remained grassroots-driven throughout its history. Bike the Neck coordinated all aspects of trail development,
contributing significant amounts of unpaid time to accomplish important tasks such as writing grants, working with property owners to acquire land, and holding fundraisers. To accomplish the technical tasks that in Durham’s case were accomplished by city department staff, Bike the Neck received significant in-kind assistance from local and regional experts.

*Community champions.*

The role of individual champion(s) was a key difference between the two communities’ trail development processes. In particular, interviewees in Georgetown County reiterated the critical role played by champion Lynne Reed, who spearheaded and coordinated nearly every aspect of trail development. Together, the two champions leveraged prior education and experience in the planning process, as well as connections and relationships with key leaders in the local government and tourism industry. It was clear from the interviews that Lynne Reed made possible the success of the 13-year Bike the Neck initiative.

> “Lynne Reed was such a convincer. She was really good...She was doing everything, she was doing the plans, she was doing the match, you know, she would go out and raise the match so that the County had no commitment at all in the funding.” – Key Stakeholder in Georgetown County.

In Durham, perhaps because DOST holds joint leadership of urban greenspace initiatives, no prominent community champions emerged as a driving force behind Durham’s trail system. Although DOST was initiated by two local elected officials interested in creating a local trail system (a city council person and a mayor), these individual champions no longer play a prominent on-going role in the group.

*Partnership coordination and shared responsibility.*

Collaborative relationships contributed greatly to the success of each initiative, but the two communities addressed the issue of shared responsibility differently. Responsibilities
for the trail initiative in Durham were shared mainly among official city departments. Parks and Recreation and City/County Planning undertook most of the work associated with Durham’s trail system. In particular, Parks and Recreation was heavily tasked with trail implementation duties, bearing responsibility for land acquisition negotiations, the trail construction process (i.e., design, environmental permitting, and overseeing the competitive bidding process), securing outside resources for trail construction via annual city budget and outside resources (e.g., grants), coordinating trail maintenance, and promoting trail use.

In contrast, Bike the Neck obtained more technical assistance for trail development from agencies outside local government. Three different partners shared the same responsibilities associated with Durham’s Parks and Recreation Department. The local USDA Natural Resource Conservation Service budgeted staff time to manage the time-consuming trail design and construction process, while Bike the Neck and Lynne Reed completely oversaw the process of amassing funds (e.g., advocating to the Council of Governments to support the trail, writing grants, etc.) and acquiring land by speaking individually with trail neighbors. Georgetown County’s Parks and Recreation Department simply coordinates trail maintenance, requiring less time and resources relative to Durham’s Parks and Recreation Department.

Interestingly, health- or physical activity-oriented partners did not emerge as relevant participants in any aspects trail development in Durham or Georgetown County. Interviewees in Durham or Georgetown County had not collaborated with or assigned responsibilities to such partners, nor had health partners sought to become involved with the trail initiatives. This absence emerged despite the fact that most stakeholders discussed trails’ potential health benefits as an important justification for constructing trails.
Fundraising and leveraging resources.

Durham’s local government plays a visible role in funding greenway development. The city contributes annual budget allocations, voter-approved bond issues (three separate multi-million dollar bonds have been issued in the 1992, 1996, and 2005), and supports trail development via development impact fee revenue. Durham also allocates staff resources to implement trails. Departmental staff succeeded in gaining grant funding to benefit the North-South/ATT Corridor. Despite the local government commitment to fund Durham’s trail system, key stakeholders indicated that available funding does not always meet trail development and maintenance needs:

“…there have been so many other priorities within the community…And often, you know, [trails are] one of the first things cut because it’s not considered essential,” ~ Key Stakeholder in Durham.

“One reason it’s taken us so long for the North-South Greenway is [because] in between the big chunks of money we didn’t have money to do any acquisition.” ~ Key Stakeholder in Durham.

Georgetown County limited its financial commitments to serving as Bike the Neck’s fiduciary agent, agreeing to perform routine maintenance for the trail, and covering liability. In terms of trail construction, the county contributed only a fraction of the necessary cost via local accommodations tax revenues resulting from the hospitality industry. Bike the Neck therefore invested significant time and effort into securing the funding and in-kind expertise needed to construct trails. The contribution of local grassroots fundraising efforts especially contrasted with Durham’s approach. Often in partnership with supportive local businesses, especially in the tourist industry, Bike the Neck held golf tournaments and raffles, sponsored dances and events, hosted flea markets, and sold T-shirts. They have also sent numerous mailings to community residents requesting donations, and successfully requested easement
donations from property owners since land purchase would have been too great an expense. Their grassroots fundraising efforts were successful enough to entirely fund the first several trail segments.

Table 3.

*Summary of Preparation Strategies in Durham and Georgetown County Trail Initiatives*

<table>
<thead>
<tr>
<th>Preparation Strategy</th>
<th>City of Durham</th>
<th>Georgetown County</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impetus and leadership</td>
<td>Government-led process.</td>
<td>Grassroots-led process.</td>
</tr>
<tr>
<td>Community champion led trail development</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Partnership coordination and sharing of responsibility</td>
<td>Most implementation tasks accomplished by local government staff; fewer shared responsibilities.</td>
<td>Implementation tasks coordinated among multiple agencies; more shared responsibilities.</td>
</tr>
<tr>
<td>Fundraising and leveraging resources</td>
<td>Local government provided and coordinated most trail funding. Insufficient funding emerged as a barrier to trail progress.</td>
<td>Grassroots advocacy group sought and coordinated most trail funding. Insufficient funding did not emerge as a barrier to trail progress.</td>
</tr>
</tbody>
</table>

*Promotions*

Trail studies emphasize the importance of promotions in order to generate community awareness and use of trails (Brownson et al., 2005; Reed et al., 2004; Merom et al., 2003). Durham and Georgetown County each engaged in trail promotions, primarily with community-wide communications to inform the public of the trail’s presence. The communities lacked a social marketing approach to encourage trail use among specific target audiences, despite the evidence that demographic and contextual factors – including gender, income, and even surrounding land uses – appear to impact trail use (Troped et al., 2001;
Reed et al., 2004; Brownson et al, 2000; Lindsey et al., 2006) Each community’s promotions strategies are explored in greater depth, and summarized in Table 4.

*Community-wide promotions.*

General trail promotions in Durham and Georgetown County included route maps (hard copy and on-line); events such as fun-walks or rides sponsored by various organizations; and periodic volunteer trail clean-up events on special days like Earth Day or National Trails Day. Both communities also generated local media attention for ribbon-cuttings and new trail segment celebrations. In Durham, DOST publishes and sends a monthly newsletter to community members on its mailing list, and periodically mails information about trails to the entire community via inserts in utility bills. Parks and Recreation and DOST jointly host display booths at local community festivals to increase trail awareness. In Georgetown County, besides Bike the Neck’s events, maps, website, the local tourism industry also produces materials to promote the trail. Rental properties and real estate agencies, for example, distribute maps that promote the trail as an area amenity, and three thriving bicycle rental shops promote trail use among local residents and tourists.

*Social marketing techniques.*

The Durham Parks and Recreation Department expressed a desire to engage in social marketing activities for the trail, but budget constraints prevented staff from undertaking such initiatives. One interviewee noted that the city consistently denies their department’s annual request to fund a marketing staff person to promote the trail system. Neither DOST nor the Parks and Recreation Department has sought in-kind support or collaboration with other groups or agencies that could potentially devote their staff or budget resources towards trail promotion.
“We’d like to do more trail promotions…we were thinking, ‘Gee, it would be really neat to have some neighborhood walks up to the ballpark’. [because] the trail ends right there at the ballpark…have 20 people from Woodcroft [neighborhood] walk up the trail and go to the ballgame together. It would be fun, but, again, we don’t have anybody to promote that- ” – Key Stakeholder in Durham

“We don’t have any [materials accessible to non-English speakers] to date, but we do have a woman on staff who’s very interested in outreach to the Hispanic community and that’s something I think we should pursue.” – Key Stakeholder in Durham

In Georgetown County, no particular group or agency expressed a need to promote trail use beyond general awareness-raising (i.e., use of maps and brochures), earned media, and special events. In line with its core mission, Bike the Neck engaged in more advocacy-related promotional activities geared towards building support for trail among citizens and policy makers. For this reason, perhaps, they do not coordinate social marketing promotions of the trail nor seek support from other groups or experts to conduct such promotions. Key stakeholders discussed their perceived adequacy of current promotions; curiously, one even mentioned that increased promotions might overburden the trail facility.

“…my feeling has been once we saw how long all this was going to take that it was really better not flooding the community with too much [greenway] traffic.” – Key Stakeholder in Georgetown County

Both similarities and differences existed in the extent to which partners in each community shared responsibility for targeted promotional strategies. In Durham, several watershed protection groups promoted community awareness of watershed protection surrounding creekside neighborhoods. Such groups organized trail clean-up days and encouraged participation and trail use among their constituencies and trail neighbors. On the other hand, Georgetown County demonstrated few partnerships with interest groups seeking to promote trail use. Although the tourism industry contributed to general trail promotions, no other organizations worked with specific target audiences to encourage trail use.
Interestingly, neither community sought partnerships with health-oriented groups specifically to conduct trail use promotions, nor had health-oriented groups initiated any efforts to promote trail use in the community. The absence of public health organizations, given their interests in encouraging walking and bicycling, was a surprising gap.

Table 4

*Summary of Promotion Strategies in Durham and Georgetown County Trail Initiatives*

<table>
<thead>
<tr>
<th>Promotion Strategy</th>
<th>City of Durham</th>
<th>Georgetown County</th>
</tr>
</thead>
<tbody>
<tr>
<td>General trail use encouragement</td>
<td>Used maps, brochures and special events.</td>
<td>Used maps, brochures and special events.</td>
</tr>
<tr>
<td>Targeted social marketing techniques</td>
<td>Recognized as a need, but not conducted due to insufficient funding.</td>
<td>Not recognized as a need and therefore not conducted.</td>
</tr>
<tr>
<td>Partnerships and shared responsibility</td>
<td>Limited involvement from neighborhood associations. No public health partners involved.</td>
<td>Limited involvement from tourism industry. No public health partners involved.</td>
</tr>
</tbody>
</table>

*Programs*

Trail-oriented physical activity encouragement programs provide organized and routine opportunities to engage in trail use. Neither community demonstrated a strong focus on programs designed to increase trail use and physical activity. Interestingly, however, the trails in this study purposefully accommodated utilitarian travel (i.e., by connecting residential areas with destinations of interest), a design feature that may alleviate some need for trail use programs. Even so, individuals who walk or bike for recreational and utilitarian purposes are more likely to meet the recommended levels of physical activity (Berrigan, Troiano, McNeel, Disogra, & Ballard-Barbash, 2006). Physical activity programs associated
with trails may therefore enhance a trail’s positive community health impacts. Each community’s program strategies are explored in greater depth, and summarized in Table 5.

Interview evidence suggested that outside groups in each community use the local trails to conduct regular physical activity programs. In Georgetown County, one interviewee mentioned an ongoing walking program for senior citizens, organized by a local community center. The program participants make regular use of the trail and frequently inform the county of maintenance needs. In Durham, at least one group, a local running club, organizes and promotes a weekly run on the American Tobacco section of the trail. Programs associated with each trail, even if few exist, fit successfully within the context of their respective communities.

The limited number of physical activity-related trail programs may reflect the lack of health-oriented partners involved in each community’s trail development initiatives. Key stakeholders in Georgetown County, including Bike the Neck, did not initiate physical activity programs, nor did they aim to secure resources or partnerships to facilitate trail programming. Despite the trail’s moniker – the Waccamaw Neck Bikeway – no organized recreational bicycling clubs currently exist. Likewise, DOST and other community groups associated with Durham’s trial system emphasized their environmental protection and trail management roles, and overlooked physical activity promotion as a specific objective. Although key stakeholders in both communities expressed interest in expanding the availability of trail-related physical activity programs, initiative leaders have not established relationships or support from health promotion partners to accomplish such aims.

Table 5

Summary of Program Strategies in Durham and Georgetown County Trail Initiatives
<table>
<thead>
<tr>
<th>Program Strategy</th>
<th>City of Durham</th>
<th>Georgetown County</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organized trail use opportunities</td>
<td>Local running club sponsors weekly runs on the ATT. Key stakeholders do not coordinate programs or involve partners to do so.</td>
<td>Community center organizes walking club for seniors. Key stakeholders do not coordinate programs or involve partners to do so.</td>
</tr>
</tbody>
</table>

**Policy**

Formal and informal policies contributed to the success of the trail initiatives in Durham and Georgetown County. Policies facilitated the development of an interconnected trail network as opposed to isolated trail projects. Both communities addressed a similar policy considerations, including greenway master planning, land acquisition, trail funding and trail use issues. Given the differing political contexts in Durham and Georgetown County, policy strategies materialized differently. Each community’s policy strategies are explored in greater depth, and summarized in Table 6.

*Greenway master plans.*

Master plans provide guidance for future government actions by connecting the community’s vision and values with a desired spatial layout. Master plans often refer to ‘comprehensive land use plans,’ documents that guide a broad set of actions related to a community’s future spatial development goals. Within comprehensive plans, communities often employ collections of additional plans to achieve specific aims such as greenway planning (Berke, Godschalk, Kaiser, & Rodriguez, 2006). Greenway master plans facilitated trail development in Durham and Georgetown County. As an additional testament to the success of each trail, long-range comprehensive planning documents recognize and accommodate greenways, demonstrating the local commitments to include greenways in future growth and development.
In Durham, DOST worked with city planning staff to create the first Master Greenway Plan in 1985, which was most recently updated in 2001. DOST and local citizens initially wanted to provide a greenway system for transportation and recreational, but also environmental and natural habitat protection. Because of this, most of the identified routes occur along stream corridors. Additionally, Durham incorporated unused rail beds in their master plan in the hopes of bringing rail-trail facilities into the greenway system. Because of the permanence of these two geographic features (i.e., streams and rail beds), the physical location of trails varied little from the Greenway Master Plan Map. The North-South Corridor specifically emerged as the highest priority of the greenway master plan because it was seen as the “spine” that provided accessibility to important destinations connections to other planned trails. As one key stakeholder stated, “If we had done that…[master plan and regulatory structure] 50 years ago we’d have a whole lot more trails.”

Bike the Neck initiated the Waccamaw Neck Bikeway Master Plan in 1994. The group sought planning expertise from the Waccamaw Council of Governments (COG), the local branch of the USDA Natural Resource Conservation Service, and South Carolina Department of Transportation (SCDOT). These agencies identified greenway routes and created trail design standards. The Waccamaw COG eventually retained a professional consulting firm to finalize the Waccamaw Neck Master Plan. Trail implementation has been relatively flexible in order to accommodate changes in the county’s long-range development plans. For instance, when Bike the Neck and their technical collaborators learned that a trail route originally identified on the Master Plan would no longer include residential development as originally anticipated, consultants revised the plan to allow a connection to the new development plans.
In addition to being part of local greenway master plans, parts of the North-South/ATT Corridor in Durham and the entire Waccamaw Neck Bikeway in Georgetown County are designated components in the East Coast Greenway, a national greenway system that aims to link trails from Maine to Florida (East Coast Greenway [ECG], n.d.). The National ECG Alliance works with state chapters to designate official routes in communities throughout each state. Additionally, part of the North-South/ATT Corridor is designated in North Carolina’s planned Mountains-to-Sea trail route. These connections to larger state and national projects have helped the trail initiatives leverage different types of federal funding.

Land acquisition.

In order to implement trails, communities must obtain the rights to build on a series of contiguous parcels that comprise the trail route. Acquiring rights to the land can be expensive and contentious, but policies have enabled both communities to obtain land in developed and developing areas. Greenway master plans compliment land acquisition, since they identify desired trail routes and provide the rationale to seek the rights and permission necessary to build trails.

Policies that encouraged or required developers to dedicate trail easements in accordance with greenway master plans aided the land acquisition process in Durham and Georgetown County. Developers generally supported trail easement donations, but the local governments differed in their approaches to ensuring easement provision. Durham officially enacted the policy through its subdivision ordinance in 1988, and it continues to exist in the updated Unified Development Ordinance. Residential developments that coincide with the Master Greenway Plan Map must dedicate land or allow trail easements. The city does not require easements of non-residential developments, although the planning staff always asks
for voluntary dedications, usually with success. The North-South Corridor benefited less from these policies compared to newly developing areas in Durham, although the policy facilitated acquisition of several key urban infill parcels on the North-South Corridor.

Similarly, the Georgetown County planning staff usually ask developers to dedicate trail easements along planned developments, including residential and golf resort areas. They aim to sell the trail’s benefits to developers and use easements as negotiating tools. Although the County lacks formal ordinances to require compliance, developers generally accommodate trail easements, and a large portion of trail easements were obtain in this manner. The policy lacks a formal means of institutionalization, however, making it vulnerable to inconsistent implementation. For successful application, planning staff must understand and support the policy, sometimes difficult in situations of staff turnover. In one case, a new development application arrived at a time when a key staff member, a trail supporter, was not part of the development application. The presiding staff member forgot to request an easement, missing a key opportunity to implement part of the greenway system. One stakeholder commented on the challenges of ensuring uniform staff understanding about the greenway:

“[The trail] is not a priority for the county, and I would say that's even triply so the case right now with the new hires, who are taking over positions...[A former county employee] saw the advantage and benefit of it and made it work within the county.”

Both communities experienced cooperation from outside agencies to provide no or low-cost greenway easements, although Georgetown County benefited from relatively more such segments. Departments of Transportation (DOT) provided key assistance. Durham leases American Tobacco Trail easement from the North Carolina DOT for a nominal fee, while many sections of the Waccamaw Neck Bikeway were constructed inside South
Carolina DOT right-of-way, avoiding the need to purchase or obtain easements from property owners. For other trail segments in both communities, power companies donated utility easements, and in some cases provided in-kind assistance with trail construction. Georgetown County gained easements from additional local groups. Murrells Inlet 2007, a local partnership that represented the Murrells Inlet tourism industry, convinced SC DOT to paint bicycle lanes when they repaved the road. Huntington Beach State Park welcomed the bike path across its land, provided the design would prevent bicyclists from access other areas of the park without paying the admission fee.

Both communities negotiated directly with individual property owners in order to acquire some parcels of land. Property owners often responded favorably to appeals made by citizens rather than government agencies. In Georgetown County, for example, Lynne Reed asked individual property owners to donate necessary easements, usually with success. She also met with owners adjacent to DOT right-of-way sections to explain property boundaries and encourage support for the trail. Little if any funding was needed for individual parcel acquisition, because Bike the Neck obtained most of its land easements through dedications, donations, or right-of-way. Said one stakeholder:

“I think Lynne Reed [explained to] these property owners and business people…the economic impact was going to be to their advantage…I think in a touristy area, bike paths are just part of being a tourist.”

In contrast, land acquisition from individual property owners in Durham, an urban area, was more difficult compared to Georgetown County. Difficulty arose from property owners’ mistrust of government, property rights objections, and fear of crime. In such instances, noted one interviewee, no policies facilitated land acquisition. The process of trail development simply stopped until the landowner reconsidered or until a supportive owner
bought the property. Durham’s Parks and Recreation Department realized the advantage of citizen-to-citizen appeals, however, and facilitated such meetings when possible. For example, a community member who supported the trail in her backyard spoke at public meetings and accompanied department representatives to land acquisition meetings with individual property owners. Additionally, as a citizen-based advisory board, DOST met with local residents near proposed trails to encourage community acceptance and support. Such informal policies have been helpful, although lack of funding to acquire rights to individual parcels still represented a major barrier for trail development in Durham.

**Funding.**

Trail projects require large capital outlays and dedicated time from professional experts. Finding the political will to secure and dedicate the necessary funding often results from policy decisions. For the two communities in the study, funding policies reflected the type of government involvement in trail development.

Durham’s city government made the up-front commitment to fund a greenway system. Funding policy therefore centered on the city budgeting process, and the City Council allocated funding based on DOST’s recommendations and the staffing needs of the departments responsible for trail development and implementation. The money allocated by City Council, however, is not always seen as adequate. Interviewees expressed a sense that trails were considered a non-necessity and therefore vulnerable to under funding.

In contrast to Durham, Bike the Neck organized in Georgetown County as a direct result of local government’s inability to prioritize funding for a trail system. Policy makers soon recognized the group’s advocacy, fundraising, and efforts to obtain ECG designation status. Concurrently, the Waccamaw COG made a policy decision to put 80% of its federal
transportation enhancement funding towards East Coast Greenway projects in order to support a major regional project. Bike the Neck’s reputation and accomplishments positioned the group to help the COG accomplish its mission. In turn, the decision to put all enhancement funds towards the Waccamaw Neck Bikeway bolstered County Council’s supportive stance towards Bike the Neck.

Trail use policies and policy enforcement.

Policies affected the usability of each trail, but the communities differed in the extent to which they enacted and enforced trail use policies. Durham recently passed a policy to keep the American Tobacco Trail section open after dark, allowing bicycle commuters to use the trail in winter months. Other interviewees discussed policy responses to fear of crime. Following two separate incidents that took place on the ATT several years ago, the city increased its presence of bicycle patrol law enforcement officers and mowed tall grass in areas along the ATT where criminals were perceived to hide.

Rather than fear of crime, Georgetown County stakeholders reported conflicts between trail use-types as a problem, but felt that the County responded inadequately to such issues. For instance, although trail policy prohibits motorized vehicles, golf cart users from resort communities frequently use the trail to make functional trips to commercial locations. Problems arise because the carts occupy the entire width of the trail, and in some cases, residents allow underage children to drive golf carts along the trails. Additionally, one section of the trail in Pawley’s Island coincides with a restaurant parking lot where automobiles frequently park, forcing trail users onto Highway 17 in order to circumvent the parked cars. Although the County Council passed a policy that officially prohibits parking on the trail, local law enforcement and the restaurant owners ignore the policy and fail to
penalize violators. Finally, some cyclists use the trail at higher-than-intended speeds, creating unsafe conditions for the intended recreational users. Several key stakeholders expressed frustration with the lack of actions taken by the county to actively enforce greenway rules.

Table 6

*Summary of Policy Strategies in Durham and Georgetown County Trail Initiatives*

<table>
<thead>
<tr>
<th>Policy Strategy</th>
<th>City of Durham</th>
<th>Georgetown County</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greenway Master Plans</td>
<td>Created by DOST and city staff; first adopted in 1985. Recognized by the City’s comprehensive plan and regional greenway plans.</td>
<td>Created by Bike the Neck and Waccamaw COG; first adopted in 1994. Recognized by the County’s long range transportation plan and regional greenway plans.</td>
</tr>
<tr>
<td>Land acquisition</td>
<td>Facilitated by formal ordinance to obtain easements on new and infill development, partnerships with NC DOT and power company, and informal relationships with citizens. Many parcels must be purchased; lack of consistent funding creates a barrier.</td>
<td>Facilitated by informal policy to seek easements on new development, partnerships with SC DOT, State Park, power company, and tourism industry, and informal relationships with citizens. Few parcels must be purchased. Funding not a barrier.</td>
</tr>
<tr>
<td>Trail funding policy</td>
<td>City government provides and coordinates most trail funding mechanisms. Funding perceived as insufficient to meet trail needs.</td>
<td>Grassroots advocacy group coordinates most funding mechanisms. Policy support from Waccamaw COG allowed significant federal enhancement funding.</td>
</tr>
<tr>
<td>Trail use policies and policy enforcement</td>
<td>Policies adopted and enforced to alleviate fear of crime issues.</td>
<td>Policies adopted but not enforced to alleviate conflicts among different use types.</td>
</tr>
</tbody>
</table>

*Physical Projects*
Durham and Georgetown County aimed to provide a connected trail network that supported recreational and utilitarian use; the communities therefore combined various types of facilities, such as shared sidewalks, bicycle lanes, and share-the-road areas, to link off-road trail segments into a continuous path. Differences trails’ safety and convenience, however, may impact the likelihood of trail use (Lindsey et al., 2008; Lindsey et al., 2006; Brownson et al., 2000). Although trail users may find some types of trail facilities more or less desirable, trail characteristics may increase user-friendliness even on less-than-ideal segments. This section examines the quality of each trail’s wayfinding markers, safety design, and trail maintenance practices as indicators of the physical trail facilities to attract users. With the exception of trail maintenance, a topic discussed with key stakeholders, findings in this section are based upon the researcher’s direct observations. Table 7 summarizes the results for each community’s physical project strategies.

Wayfinding markers.

Trail users need to easily navigate a trail system, especially in potentially confusing areas – for example, where sidewalks or bicycle lanes segments connect off-road trail segments, or where trails cross the street. Clearly displayed signage or symbols indicating a trail’s start, stop, or continuation may eliminate directional confusion. Additionally, signage and maps on trails may assist individuals to understand their location along a trail and in relation to other destinations. The trails in Durham and Georgetown County each provided a means of wayfinding, although in both cases, improvements in the consistency and ease of sign and symbol interpretation could enhance navigability.

Durham marks trails with small wooden signs that feature a trail system logo. The American Tobacco Trail section features separate self-named and East Coast Greenway
logos. Wayfinding signs, often posted at trail entrances, use street names and arrows to direct trail users. Trail entrances without signage are difficult to locate, however. In residential areas of the North-South Corridor, the trail logo signs clearly mark sidewalk connections between off-road trail sections, helping users to locate trail connections. Directional signs are not present in all areas, such as parts of downtown, and share-the-road sections near Whippoorwill Park. Street painting is commonly used to aid wayfinding, including stripes between street crossings that help users find trail connections at each end of a road crossing, and painted bicycle symbols inside bicycle lanes, although the system lacks bicycle lane symbols in areas near Downtown Durham. Finally, several trail maps are located in areas where the trail traverses city parks, but maps did not provide instructions for reaching other potentially utilitarian destinations. Overall, signage on the North-South Corridor and ATT provides trail branding and clarity for users. Wayfinding on the trail could be improved via additional system maps, and more consistent use of the signage and on-road bicycle symbols, especially in the areas of Downtown Durham and north of Rock Quarry Park.

Waccamaw Neck Bikeway markers are small blue metal signs on metal posts. The signs feature a bicycle symbol and the words, “Bike Route.” There is no use of signage to brand the trail, such as a “Bike the Neck” logo to increase recognition of the trail, the grassroots advocacy group, or users’ appreciation for the trail as a unique local asset. Although the Waccamaw Neck Bikeway features some long, uninterrupted sections of off-road trails in which wayfinding is not a concern, street crossings lack directional signage and painted crosswalks or stripes. In the absence of these features, it was difficult to find trail continuations beyond a street crossing, particularly across Highway 17 or wide boulevards. Additionally, two share-the-road sections characterize the Waccamaw Neck Bikeway, each
of which connects gaps between paved trail sections. One such share-the-road connection between Litchfield and Huntington Beach State Park provides directional signage; however, the signs use verbiage and street names rather than symbols and arrows to direct trail users, potentially confusing lower-literacy trail users or those unfamiliar with area street names. The other share-the-road connection lacks directional signage, and the trail system as a whole lacks maps to assist in wayfinding along the trail sections and to community destinations. Overall, the Waccamaw Neck Bikeway could benefit from several improvements in wayfinding, including use of branded and consistently placed signage, use of system-wide maps to aid in navigating the trail and functional destinations, use of symbols and visually-based directional signage, and greater use of on-road painted symbols on bicycle lanes and between intersections to provide additional clarity for users.

Safety in trail design.

Key stakeholders indicated that trail safety, particularly from automobile conflicts, was an important concern to trail users. Key stakeholders in Durham and Georgetown County indicate that automobile conflicts represent the most persistent concerns about safety, even in Durham where fear of crime also influences trail use. Street crossings and driveway conflicts present the most likely automobile encounters. Attention to safety issues in the design of trails may mitigate such concerns.

A relatively standard set of design safety features characterize Durham’s North-South Corridor and American Tobacco Trail. Trail stop signs are placed prior to intersections, alerting trail users to automobile right-of-way. Additionally, striped or painted crosswalks at most street-trail intersections alert trail users and drivers of each other’s presence. A bicycle advocate in Durham noted that cyclists and neighborhood groups use listservs to
communicate dangerous areas among themselves and to city staff. Examples of safety upgrades made by Parks and Recreation and other city departments include potholes, intersection re-stripping, and street lighting at intersections. Additionally, the route’s location along rail trails and stream corridors results in physical separation from the roads. This creates few residential or commercial driveway conflicts, a feature that also contributes to trail safety.

Design safety features are less consistent along the Waccamaw Neck Bikeway. The only trail stop signs occur where the trail crosses the Huntington Beach State Park entrance gates. Ironically, the single accident that occurred on the trail to date took place at that location, where a bicyclist failed to stop, hitting a slow-moving automobile. Along the rest of the trail, however, trail stop signs do not precede street crossings. Street crossings also lack painted zebra stripe or crosswalks to alert trail users and automobiles of the potential conflict. A particularly dangerous intersection occurs near the Litchfield section of the trail that intersects with the 4-lane Highway 17. At one corner where the trail ends, automobiles follow a right-turn-no-stop pattern, but the intersection lacks trail signs or painted crosswalks to assist trail users in crossing. In other trail segments, driveway conflicts exists where easements were obtained within DOT right-of-way for the sake of funding constraints. In areas with multiple driveways or commercial areas, such as Pawleys Island or the Murrell’s Inlet bicycle-lane section, signs or painted features could better clarify the right-of-way for trail users.

Trail maintenance.

Routine and long-term trail maintenance ensures community members enjoyment of a high-quality physical structure well into the future. The Parks and Recreation departments in
both Durham and Georgetown County are primarily responsible for trail maintenance. In fact, for Georgetown County, maintenance is the most significant obligation of the local county government, since Bike the Neck coordinates all other aspects of trail development. Differences exist in the degree to which the departments institutionalize maintenance procedures.

Georgetown County’s Parks and Recreation and Public Works departments together institutionalized a set of systematic maintenance procedures. Routine duties include sweeping the trail every 2 weeks to 1 month, while minor repaving and asphalt repair takes place as needed. Demonstrating its strong commitment to maintenance, the county purchased a special piece of sweeping machinery at a cost of over $20,000 to improve the efficiency of trail sweeping. Additionally, the County’s award-winning system, “At Your Request,” tracks maintenance needs. The system allows staff or community members to directly enter requests on-line. Staff can also place requests into the system when community members directly call the staff with their maintenance requests. Each request generates a work order and allows the county to track costs and monitor problems that continue to exist in certain locations. The county’s commitment does not cover major trail disruptions (e.g., from natural disasters such as hurricanes). Bike the Neck would take responsibility for locating outside funding to cover such costs should they arise.

In Durham, Parks and Recreation secures funding for maintenance, although the city’s Department of General Services conducts actual routine maintenance duties, including mowing and litter removal from the trails. No formal system exists to track maintenance issues as in Georgetown County. Parks and Recreation responds to requests from community members as they arise, often from neighborhood association members and local bicycling
advocates. Interviewees mentioned that funding for maintenance projects is not always consistent or adequate. Said one participant, “Some years we have money for maintenance, some years we don’t. What we really need is a designated amount every year.” In fact, citizens of Durham have expressed dissatisfaction with the level of maintenance in the parks and greenway system in recent years, and voted in 2005 to fund a bond issue which will heavily go towards maintenance instead of new trail construction.

Interestingly, while Bike the Neck has generally been a grassroots initiative, trail maintenance involves little grassroots involvement. Durham, on the other hand, facilitates strong grassroots involvement in trail maintenance through its “Adopt-a-Trail” program. Administered by Parks and Recreation, and officially promoted by DOST, Adopt-a-Trail directly involves community members in ongoing trail stewardship and upkeep by allowing local neighborhood organizations or groups to adopt segments of the trail. Benefits of the approach include an enhanced sense of community ownership along the trail system. Several Adopt-a-Trail groups are associated with the North-South Corridor.

Table 7

Summary of Physical Project Strategies in Durham and Georgetown County Trail Initiatives

<table>
<thead>
<tr>
<th>Physical Project Strategy</th>
<th>City of Durham</th>
<th>Georgetown County, SC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wayfinding markers</td>
<td>Signs use logos and require low literacy. Painted street crossings assist in wayfinding. Little use of maps on trail to guide users.</td>
<td>Signs lack logos and some require high literacy. No painted street crossings to assist in wayfinding. No use of maps on trail to guide users.</td>
</tr>
<tr>
<td>Safety in trail design</td>
<td>Consistent use of safety design features, including trail stop signs and painted stripes at street intersections, and few driveway access conflicts.</td>
<td>Little or inconsistent use of safety design features such as trail stop signs or painted stripes at intersections. Several areas characterized by</td>
</tr>
</tbody>
</table>
### Maintenance policies

| Parks and Recreation department coordinates; no formal tracking system to monitor requests. Significant community grassroots involvement. Funding not always sufficient to meet needs. | Parks and Recreation department coordinates; uses a formal tracking system to monitor requests. Little community grassroots involvement. Funding so far sufficient to meet needs. |

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*Trail use variations by intra-trail locations.*

Trail use count data provides information about the extent to which physical activity takes place on a trail. The data are not intended to differentiate the degree of success between the two trails. Such a comparison would be inappropriate due to core differences between the two communities, since Durham more dense urban region compared to Georgetown County. Moreover, seasonal differences in the time of trail count collection further skews the data in favor of Durham. Nevertheless, the counts provide useful information about the trail use variations among different segments within the same trail.

Overall, trail counts in both communities show one important outcome: the trails appear to be generating use. Additionally, each trail demonstrated variations in use patterns among different segments. In Durham, counts indicate that the highest rates of trail use occurred on weekends, likely when more individuals engage in recreational physical activity. The weekend trail use counts were especially high on the southern-most segment of the ATT (Dunhill Drive), one which is also nearest to a trail parking lot and a shopping center that may help a large number of individuals access the trail. The same pattern characterizes the location near ATT and Riddle Road, although at somewhat diminished levels of use.

Weekday trail use varied by trail segment location. The highest-quality trail facilities (i.e.,
the ATT rail-trail segments) appeared to generate the highest rates of trail use, with the ATT segments generating more use compared to the segment along Ellerbe Creek. Also of interest, the ATT segment at near Blackwell Road, which is near the Durham Bulls baseball stadium at the edge of downtown, did not vary between weekend and weekday use. Trail use counts are presented in Table 8. Additionally, Figure 5 depicts the interactions between trail use and segment location and weekday. For mapped trail segment locations, see Appendix G.

Table 8

*Average Trail Use by Location and Day, Durham NC*

<table>
<thead>
<tr>
<th>Trail Location</th>
<th>Average Weekend Use</th>
<th>Average Weekday Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATT @ Dunhill Drive (1)</td>
<td>804.4</td>
<td>333.9</td>
</tr>
<tr>
<td>ATT @ Riddle Road (2)</td>
<td>306.7</td>
<td>101.8</td>
</tr>
<tr>
<td>ATT @ Blackwell Avenue (3)</td>
<td>255</td>
<td>256.9</td>
</tr>
<tr>
<td>N-S @ Knox Street (4)</td>
<td>146</td>
<td>54.4</td>
</tr>
</tbody>
</table>

*Figure 5. Average trail use by location and day, Durham NC*
In Georgetown County the Waccamaw Neck Bikeway appears to generate consistent, despite the fact that the trail use counts in this area were conducted during winter months when colder weather and little tourist activity would be expected to correspond to the lowest levels of activity. Future use counts are planned along additional segments and during summer and fall seasons to provide more robust information about trail use. Nevertheless, comparisons were made from the available information. Comparisons by day of the week and trail segment indicate that the Trace Drive location, which coincides with the Huntington Beach State Park segment of the trail, generates its highest average use on the weekends and drops during the weekdays. This likely corresponds to higher numbers of weekend park visitors.

On the other hand, trail use along the Wilbrook Drive segment remains relatively consistent on all days of the week. This area of the trail is adjacent to the Litchfield-by-the-Sea golf resort community and a shopping center. Even though the location is relatively close to Huntington Beach State Park, the increased rates of weekend trail use do not appear to spill over to this trail segment. In comparison to Durham, where trail use rates seemed to vary depending upon the quality of the trail facility, this did not necessarily appear to be the case for trail use counts in Georgetown County. For instance, weekday use in the Huntington Beach State Park segment, indicated by the Trace Drive use count, is not consistently higher than weekday use for the Wilbrook segment, even though the Huntington segment is a higher quality facility with fewer street crossings. On the other hand, the Wilbrook segment is characterized by a larger number of residences and more commercial areas that can be accessed via the trail. Trail use counts are presented in Table 9, while Figure 6 depicts the
interactions between trail use and segment location as well as day of the week. For mapped trail segment locations that correspond to the numbers below, see Appendix H.

Table 9

Average Trail Use by Location and Day, Georgetown County, SC

<table>
<thead>
<tr>
<th>Trail Location</th>
<th>Weekend Average</th>
<th>Weekday Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>WNB@ Trace Drive (1)</td>
<td>88.3</td>
<td>44.1</td>
</tr>
<tr>
<td>WNB @ Wilbrook Drive (2)</td>
<td>52.4</td>
<td>48.5</td>
</tr>
</tbody>
</table>

Figure 6. Average trail use by location and day, Georgetown County, SC
DISCUSSION

This study examined two community trail development initiatives in order to better understand the factors that led to successful trail implementation. It further explored the ways in which trail development processes may impact physical activity outcomes. Differences in the influence of local government versus grassroots leadership structures at each site, as well as differences in the use of the 5P Strategies, provided meaningful insight into the determinants of successful trail development. These differences revealed lessons to inform future trail development initiatives. Findings are discussed below.

Emerging Lessons to Inform Future Trail Initiatives

Durham and Georgetown County both succeeded in trail implementation, but under different leadership circumstances. Differences in the core strengths of each community’s approach uncovered several key lessons that could inform future community trail initiatives. The presence of focused leadership, shared commitments to trail implementation duties, and institutionalized policies and practices facilitated trail development.

Lesson 1: Secure focused leadership.

Focused leadership refers to the ability of leaders to work towards trail implementation with a lack of other distractions or priorities. Both sites benefitted from effective leaders who ensured the coordination and success of trail development activities, but differences in overt local government support led to an interesting strength in Georgetown County. Bike the Neck organized as a grassroots entity due to county government’s inability to provide direct support for trails, and the group’s leadership structure allowed it to mobilize its time and resources exclusively towards trail development. Georgetown County’s advantages in this area could inform other trail initiatives.
Durham’s trail initiative, under the leadership of DOST, split its focus between the dual goals of trail development and open space protection, each requiring separate master plan maps and subcommittees. Despite the complimentary nature of the two goals, the arrangement nevertheless indicated DOST’s inability to fully focus its time, resources and funding recommendations towards the trail system. In contrast, Bike the Neck in Georgetown County organized as a direct result of the desire to build the Waccamaw Neck Bikeway, and the trail comprised its sole reason for being. Focused leadership allowed Bike the Neck to overcome local government inertia towards trail implementation. They obtained in-kind technical assistance from various agencies, engaged in creative fundraising, and mobilized government staff to adopt trail master plans and provide trail maintenance. In Durham, despite the local government’s commitment to trail building, key stakeholders often found trail system funding insufficient to meet all implementation needs. For this reason, focused leadership emerged as a key factor in the ability to overcome trail development delays and challenges that inevitably arose.

Community champion Lynne Reed provided the driving force behind Bike the Neck’s grassroots advocacy. Reed played a paramount role in nearly every aspect of trail development and recently received a national volunteer services award, a testament to the scope of her accomplishments on behalf of the community. Without her leadership in mobilizing grassroots support and coordinating technical assistance among numerous agencies, the initiative would not likely have succeeded. Salvesen and colleagues (2008) discuss the importance of champions in implementing policies to support physical activity, but they identified champions as either elected officials who initiated policy agendas or professional staff who implemented policies on the job. Although Durham and Georgetown
County both had champions like those in Salvesen’s study, Lynne Reed’s work highlights the powerful role that grassroots champions may play in such initiatives.

Although dedicated grassroots champions may provide the element of focused leadership to community trail initiatives, Bike the Neck’s example may not be entirely replicable, since Lynne Reed had relevant expertise and a willingness to volunteer many hours of assistance. Still, many communities likely face situations like Georgetown County’s, where local government is unable to commit to trail development. For those communities, the success of Bike the Neck provides a hopeful model, indicating that committed citizens can accomplish complex trail projects. Even communities where local government overtly supports trail development could benefit from the involvement of passionate community champions and grassroots entities in order to overcome the barriers that arise in any trail development initiative.

*Lesson 2: Seek shared commitments.*

Shared commitment refers to the ability of leaders to engage diverse groups and organizations in assuming responsibility for trail development tasks. Both sites demonstrated involvement from a variety of partners, but Georgetown County was able to gain commitments from a larger number of agencies, often obtaining in-kind services. Moreover, lack of commitment from health promotion partners at both sites may explain a gap common to each initiative’s inability to prioritize trail use encouragement or integrate it with the overall trail initiative. Overall, findings indicate that trail initiatives should seek commitments from multiple agencies in order to ensure successful implementation of all goals.
Bike the Neck leveraged commitments for trail development among many partners out of necessity. Absent the ability of local government to undertake the technical tasks of trail system implementation, including master planning, trail design, obtaining project bids, and environmental permitting, Bike the Neck had no choice but to seek support from other agencies. The group secured in-kind support from outside agencies and coordinated their roles. Key partners included the regional council of governments, a local USDA office, and county government staff. This broad partnership allowed the burdens of planning and developing the Waccamaw Neck Bikeway to fall upon many collective shoulders and likely facilitated successful and timely trail implementation.

In contrast, the local government’s commitment to trail implementation in Durham concentrated responsibilities among DOST and the city’s professional staff, mainly the planning and parks and recreation departments. Durham leveraged minimal technical assistance for direct trail implementation activities, leaving the city operating budget to accommodate most of the staff time required in order to implement trails. The city therefore bore a relatively larger share of trail development costs compared to Georgetown County. In particular, the Parks and Recreation Department appeared disproportionately tasked with responsibilities, including trail route planning, environmental permitting, contracting and bidding, trail maintenance and use encouragement. The same duties in Georgetown County were shared among multiple different agencies. Give these dynamics, the ability to generate shared commitments to trail development, both within and outside local government, may facilitate the process.

In sum, coordinated involvement from multiple stakeholders could reduce the time and cost burdens placed on any one entity, and ensure that communities make steady
progress in the long-term trail development process. Additionally, commitments from partners such as public health professionals may also ensure the completion of strategies to support trail use encouragement. For these reasons, trail initiative leaders, even those led by local governments, should seek commitments from multiple agencies through partnerships and technical assistance when possible and appropriate.

**Lesson 3: Institutionalize key policies and practices.**

Trail initiatives in Durham and Georgetown County demonstrated the incremental nature of greenway development, highlighting the need to ensure stability and continuity in the implementation process. To this end, both communities demonstrated the ability to institutionalize important trail development strategies. Institutionalized policies and practices supported the strongest aspects of each initiative, and such strengths indicate that community trail development initiatives must strive to model such practices.

Local government support for trail development in Durham led to the institutionalization of several key policies and practices. First, the organizational structure inherently promoted internal consistency between policy making and implementation. Several DOST members, for instance, also served as elected officials and city staff directly involved in trail implementation. Durham’s strengths included master plan implementation, land acquisition practices, the consistent use of branding, wayfinding and safety design features in trail development, and trail-use policy enforcement. Formal mechanisms ensured implementation of each of these policies. For instance, since zoning ordinances required developers to provide trail easements along the greenway master plan, planners ensured the accommodation of trails in development plans. This and other formal policies and procedures have ensured the system’s success regardless of elected official and professional staff
turnover. Despite Durham’s limitations in providing more substantial funding to facilitate faster trail development, the system is set up to succeed over time.

In Georgetown County, commitments from county government, including fiscal oversight, acceptance of liability, and trail maintenance, provided important elements of institutionalization and long-term sustainability. In some cases, though, local government inaction prevented institutionalization of key policies and practices and detracted from the trail initiative’s success. For instance, county government failed to enforce the policies it had adopted to prevent trail-use conflicts between motorized vehicles and bicycles. The trail also lacked consistent wayfinding, branding, and safety design, indicating the absence of an organizational mechanism to ensure the provision of such important features. Additionally, without officially codified land acquisition policies, the county missed opportunities to obtain trail easements from developers due to inconsistent levels of staff experience or awareness. Salvesen and colleagues (2008) discuss the critical role of local government staff “champions” in ensuring policy implementation. Communities should seek strategies to facilitate institutionalized policies and practices among those involved in trail development tasks, perhaps through routine training or educational opportunities.

Lack of institutionalized policies may impact not only trail development, but also trail use outcomes. Patterns in trail count data indicate that the aforementioned lack of wayfinding and safety design on the Waccamaw Neck Bikeway may have diminished trail use in one area. In this case, Huntington Beach State Park’s spike in weekend trail counts did not carry over onto Wilbrook Boulevard despite only 1.5 miles of separation. The Highway 17 crossing, with its absence of wayfinding and safety features, may have discouraged weekend park users from traveling further. Without a system to avoid or address the potential barriers
to trail use, communities trail initiatives may fail to maximize their potential to increase physical activity.

Although Durham more consistently institutionalized its trail development policies and practices, this was not always the case. Trail maintenance practices in Georgetown County, for instance, demonstrated a more formal protocol to ensure routine and as-needed trail upkeep, especially with the county’s use of specialized equipment and a computerized tracking system. No formal tracking system and minimal organized structure guided Durham’s trail maintenance practices. More importantly, the city lacked an institutionalized mechanism to ensure consistent maintenance funding, a barrier that prevented sufficient maintenance in all areas of the trail. The contrast demonstrates trail initiatives’ potential to institutionalize key policies and practices regardless of differences in core leadership.

Implications for Trails’ Influence on Physical Activity

Despite successful trail development in both study sites, the 5P analysis indicated a lack of integration among the 5Ps in a manner that would be expected to maximize trail use outcomes. Specifically, strategies to support trail construction differed sharply from those supporting trail use encouragement. Extensive preparation, policy, promotion/advocacy and physical project strategies supported the trail development process, while trail use encouragement strategies were isolated and received far less attention. The distinction between the quality and integration of trail development versus trail use encouragement strategies indicates that initiatives might unknowingly miss opportunities to maximize the physical activity benefits of trail systems.

Trail development and trail use encouragement processes may be distinct for several reasons. First, communities demonstrated a lack of either commitment or capacity for trail
use encouragement. Durham lacked the latter; some key stakeholders expressed interest in conducting more targeted promotions but could not secure sufficient funding to implement such activities. Bike the Neck in Georgetown County, on the other hand, lacked a commitment to implement trail use encouragement strategies because they focused exclusively on trail development. Despite these differences, the communities showed similar weaknesses in trail use encouragement strategies. Each used minimal promotions and programs which seemed isolated from the overall vision of each trail initiative, indicating insufficient willingness or ability to undertake such activities.

Relatedly, the complexity and long-term nature of trail development itself demanded a high degree of commitment and capacity, which likely diminished the perceived importance of trail use encouragement. Building a community trail or greenway system is a costly and complicated endeavor requiring extensive planning, coordination, and persistence. Successful completion of greenway segments was understandably viewed with feelings of accomplishment, since communities had to gain support from policy makers, locate and secure funding sources, coordinate responsibilities, develop greenway master plans, and implement policies associated with trail development. Since incremental trail system implementation is a large undertaking, communities may view trail construction as the extent of their mission.

Communities may also have under-prioritized trail use encouragement strategies due to the absence of health-oriented groups or representatives in each initiative. Health practitioners or advocates could have contributed time, expertise, or additional resources to support trail use encouragement strategies. No key stakeholders sought such partnerships, however, nor did public health agencies or advocates deliberately initiate involvement with
trail projects in either community. Regardless of the reasons for the observed disconnect between trail development and trail use encouragement, the lack of public health involvement indicates that trail initiatives may fail to maximize their impacts on physical activity.

Trail use counts demonstrate that both trails are generating use, but the question remains whether comprehensive and integrated trail use encouragement could augment trail use. Based on trail count data, the answer is likely, ‘yes’. Observed variations in trail use counts intuitively correlate to the lack of promotions and programs, since the counts likely represent baseline indications of natural trail use patterns. Most segments showed augmented weekend use, an indication of increased leisure activity. Trail use also varied logically based on the presence of nearby amenities. For instance, Huntington Beach State Park in Georgetown County, a tourist attraction, showed higher rates of weekend use. On the ATT in Durham, the highest overall rates of trail use occurred nearest to the parking lot facility. The ATT segment nearest to downtown Durham, meanwhile, varied little between weekends and weekdays, suggesting a higher proportion of utilitarian trips in the walkable area. Such patterns may indicate that trails have maximized the potential to generate spontaneously-occurring use. If so, targeted encouragement efforts could generate additional trail use and physical activity.

Consistent with findings from Aytur and colleagues (2008), this study indicates that trail initiatives should consider comprehensive, socioecological strategies to increase population physical activity even when environmental supports exist. In the former study, researchers found a positive association between communities’ “Active Community Environments” scores and population rates of physical activity, but also observed variations
in physical activity based on community income and non-white population percentages. The authors report other findings where physical activity varies by age, income, and education, and point to a complex relationship between physical activity and environmental supports. They reiterate the notion that the physical environment alone does not address the complex set of cultural norms, social support, attitudes, beliefs and skills associated with physically active behavior (Aytur et al., 2008). Such assertions support the utility of the 5P Model as a means to encourage physical activity through multiple, integrated socioecological supports.

This study also raises questions about the role for public health and health advocacy practitioners in trail initiatives. Leaders and partnerships that coordinate trail system development seem unlikely to include trail use encouragement within their core mission, given the demands and expense of trail planning and construction. Health advocates and experts should therefore seek opportunities for involvement in community trail initiatives. Absent their expertise and influence, trail initiatives will not likely adopt health-outcomes goals or the multi-level strategies likely to increase physical activity.

Additional inquiry should examine the most appropriate roles for health practitioners in trail and other policy and environmental initiatives. While this study demonstrates gaps in promotions and programs where health practitioners might add value, leaders and funders in public health now encourage practitioners to move away from such domains in favor of a focus on policy and the built environment (Bors, 2008). Findings from this study confirm the need to engage health practitioners in policy and environmental initiatives in order to increase physical activity, but their most appropriate and valuable contributions are still unknown and should be explored in future studies.

*Examining the 5P Model as an Implementation Framework for Future Trail Initiatives*
The 5P Model provided an analytical framework for this study, but the case comparison also provided an opportunity to examine the model’s potential suitability as an implementation framework for future trail initiatives. Although the communities themselves did not intentionally use the 5P Model to guide trail implementation, strengths and weaknesses among the P strategies uncovered the trails’ possible influences on physical activity. Findings also provided new insight and raised additional questions that may future use of the 5P Model as an implementation framework for similar interventions.

First, implementation of the 5P Model requires a commitment and capacity to coordinate multilevel strategies that address the multiple determinants of physical activity, not just policy and environmental supports. In this study, practitioners who implemented policy and environmental changes did not see multilevel physical activity promotion as an obvious function of their initiatives. Interviewees saw physical activity as a beneficial side effect of trail development rather than a core objective. Unless practitioners incorporate physical activity outcomes into the central purpose of trail development, even the presence of all 5P strategies will not likely provide an integrated, multilevel approach to increasing physical activity. For initiatives framed as opportunities to improve physical activity outcomes, the 5P Model may provide a useful implementation framework. It adds little value, however, for initiatives framed solely as policy or environmental change strategies.

As discussed earlier, the lack of health-oriented partnerships may have contributed to the lack of integration between trail development and trail use encouragement strategies associated with the 5P Model. This study proposes that successful implementation of a 5P framework requires a focus on physical activity outcomes. For this reason, trail initiatives should seek to meaningfully engage health partners, and the public health community should
seek to become involved in trail initiatives. In Durham and Georgetown County, key stakeholders lacked awareness of the advantages of involving health promotion partners in community trail initiatives, but no health partners sought significant involvement in the trail development initiatives. Involvement of health partners and intentional collaboration around a 5P framework could promote a shared, upfront understanding and commitment to address health outcomes as part of the mission of trail initiatives. This study therefore raises new research questions for future inquiry, including:

- Would a community trail initiative with strong involvement of health promotion partner(s) lead to better physical activity outcomes compared to a community without health promotion partners?
- What is the most appropriate role for public health in facilitating successful trail initiatives?
- Are there systematic barriers that prevent certain types of involvement from public health promotion partners?
- Does intentional use of the 5P Model result in community trail initiatives that prioritize physical activity outcomes? Under what circumstances?

Study Limitations

Findings from this study should be interpreted in light of several limitations. The qualitative case comparison format led to several weaknesses. First, case comparison limits the ability to generalize widely. Had different communities or interviewees participated in the study, it is possible that different findings and themes may have been uncovered. Additionally, and perhaps more importantly, the two study communities were substantially different in character, especially in terms of size, population demographics and geography. It is possible that some of the differences in the communities’ 5P strategies stemmed from such differences rather than the difference between government versus grassroots advocacy leadership that characterized the study sites. Future comparative studies of trail systems
might consider choosing communities that provide more demographic and geographic similarities. Better-matched comparison communities might also allow the use of trail count data to compare success of two different trails in terms of trail use outcomes, rather than within the same trail as was done for the current study.

Next, while the trail count data augmented the study’s findings, it suffered from a number of weaknesses. First, the trail counts at each trail were collected during different seasons – Durham in the fall, and Georgetown County in the winter. This almost certainly diminished the counts in Georgetown County, and while a direct comparison of counts was not being made between the two communities, it is possible that trail counts during warmer months and during peak tourism season would reveal different trail use patterns than those observed and discussed in this study. Secondly, limitations in the ability to affix infrared trail counters along the trail prevented their placement from corresponding with specific characteristics that were observed in the Physical Project section of the results. Some of these characteristics, such as differences in wayfinding and safety design features along different segments of the trail, could have impacted trail use. It would have been interesting to compare rates of trail use within each trail based on the presence or absence of such features.

Finally, the 5P Model proved to be a lengthy and cumbersome analytical format for analysis. Many distinct subcategories of trail implementation activities emerged within each P strategy. It was not always clear whether these aspects were being artificially placed within a P strategy to fit within the analysis, or if another analytical framework would have yielded different analysis and conclusions. Although Active Living by Design highlights the importance of integration among the strategies in the 5P Model, it was unclear in this study how the concept of integration would be examined, since it is not explicitly depicted in the
5P Model. Although the concept of integration did seem to emerge from the findings, a more concrete way to examine integration may have been helpful. Nevertheless, the 5P Model provided a comprehensive analysis framework for two trail initiatives, and allowed for an examination of the ways in which trail development might contribute to multilevel interventions to increase physical activity.
CONCLUSION

Communities with different levels of local government support contributed unique lessons to inform best practices for future trail development initiatives. First, funding for trail systems is a barrier for communities regardless of the level of overt local government support. The grassroots partnership offered a creative and resourceful approach to overcoming funding and staffing challenges that would benefit communities even with local government support in place. Still, communities must institutionalize key policies and practices associated with trail development, which requires a great deal of partnership and support from local government. Communities can seek strategies, such as training or education, to integrate best practices and emerging lessons into trail development initiatives.

Despite the valuable lessons that emerged to inform the trail development process, the study also revealed a disparity between trail development and trail use encouragement strategies. This indicates the need to better engage public health professionals in community trail initiatives. Unfortunately, the lack of ability to prioritize physical activity outcomes indicates that community trail initiatives are not likely to maximize their impacts in this regard. Until public health become involved in trail initiatives, such dynamics will likely prevail. Future studies should examine the most appropriate roles for public health practitioners and the best ways in which to engage the profession in trail development initiatives. To both ends, the ALbD 5P Model may be a valuable mechanism to help community trail initiatives focus on physical activity outcomes, and could also provide a means of collaboration with the public health community.
## APPENDIX A

*Trail Characteristics in Durham, NC and Georgetown County, SC*

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>City of Durham</th>
<th>Georgetown County</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location description</td>
<td>Urban, metropolitan</td>
<td>Suburban / coastal / tourism</td>
</tr>
<tr>
<td>First segment constructed</td>
<td>1985</td>
<td>1994</td>
</tr>
<tr>
<td>Most recent segment constructed</td>
<td>2006</td>
<td>2008</td>
</tr>
<tr>
<td>Trail length (miles)</td>
<td>13</td>
<td>15</td>
</tr>
<tr>
<td>Multi-use path (rails-to-trails)</td>
<td>6.4</td>
<td>0</td>
</tr>
<tr>
<td>Multi-use path (in park)</td>
<td>3.2</td>
<td>2.9</td>
</tr>
<tr>
<td>Multi-use path (in road r/w)</td>
<td>0</td>
<td>3.4</td>
</tr>
<tr>
<td>Multi-use path (in development)</td>
<td>0.4</td>
<td>4.6</td>
</tr>
<tr>
<td>Sidewalk</td>
<td>1.4</td>
<td>0</td>
</tr>
<tr>
<td>Sidewalk w/ shared lane</td>
<td>1.6</td>
<td>0</td>
</tr>
<tr>
<td>Bike lanes</td>
<td>0</td>
<td>3.3</td>
</tr>
<tr>
<td>Share the road</td>
<td>0</td>
<td>0.8</td>
</tr>
<tr>
<td>Primary funding source(s) for trail construction</td>
<td>Capital Improvement Program (CIP), bonds, grants, impact fees, annual budget</td>
<td>Grassroots fundraising, grants, developer construction,</td>
</tr>
</tbody>
</table>
APPENDIX B

Demographic Characteristics of Census Blocks within 1 mile of Trails in Durham, NC and Georgetown County, SC

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Durham, NC</th>
<th>Georgetown County, SC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Population</td>
<td>88,783</td>
<td>13,900</td>
</tr>
<tr>
<td>Population density</td>
<td>949</td>
<td>125</td>
</tr>
<tr>
<td>% Race / Ethnicity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>38</td>
<td>86</td>
</tr>
<tr>
<td>Black</td>
<td>53</td>
<td>13</td>
</tr>
<tr>
<td>Asian</td>
<td>3</td>
<td>&gt;1</td>
</tr>
<tr>
<td>Hispanic</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>Other</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>% Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>47</td>
<td>48</td>
</tr>
<tr>
<td>Female</td>
<td>53</td>
<td>52</td>
</tr>
<tr>
<td>% Age Group</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-17</td>
<td>23</td>
<td>17</td>
</tr>
<tr>
<td>18-29</td>
<td>25</td>
<td>9</td>
</tr>
<tr>
<td>30-49</td>
<td>31</td>
<td>27</td>
</tr>
<tr>
<td>50+</td>
<td>21</td>
<td>47</td>
</tr>
<tr>
<td>Median age</td>
<td>29</td>
<td>35</td>
</tr>
<tr>
<td>% Education Level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; High school</td>
<td>19</td>
<td>12</td>
</tr>
<tr>
<td>H.S. or some college</td>
<td>36</td>
<td>51</td>
</tr>
<tr>
<td>College degree (2 or 4 yr)</td>
<td>28</td>
<td>27</td>
</tr>
<tr>
<td>Advanced degree</td>
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<td>10</td>
</tr>
<tr>
<td>Unknown</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Median Household Income</td>
<td>$38,080</td>
<td>$50,193</td>
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<tr>
<td>Families</td>
<td>56%</td>
<td>31%</td>
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</table>

Source: American Fact Finder (US Census, 2000)
### APPENDIX C

*Description and Location of Key Stakeholders Interviewed for Community Trail Initiatives in Durham, NC and Georgetown County, SC*

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>City of Durham</th>
<th>Georgetown County</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trail advocacy group leader</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Parks and recreation staff</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>City or county planner</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>County transportation planner</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Public works staff</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Community bicycling advocate</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>USDA Soil Conservation specialist</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>State trails specialist</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>7</strong></td>
<td><strong>7</strong></td>
</tr>
</tbody>
</table>
APPENDIX D

Participant Recruitment Script in Durham, NC

Key Informant Recruitment Script

Title: Exploring Policy Change in the Development of Community Trails

Hello,

This is ________ from the University of North Carolina at Chapel Hill.

I was given your name by _________ (name person, only if applicable - if not then skip this sentence) as someone who has knowledge about (name of trail).

I am currently working on a research study to explore the policy change process as it relates to the development of a community trail. To further explore this issue, I am wondering if you would be interested in sharing your insights through an interview that would be audio-taped. I can send you a fact sheet that explains the interview in more detail. Is there a time during the week of ______ when you would be available and willing to sit down with me for about 30 minutes and talk with me about the trail?

[If no] Are there other community members or area officials who you think I should speak with in __________ County? May I tell them you provided us with his/her name? Thank you for your time.

[If yes] Great - thank you! I would like to send you the fact sheet - can you provide me with an email that I might use?

I recognize how busy you probably are. Is it possible to set a tentative meeting date while we are on the phone? Prior to the interview, I can send you some of the questions by email to give you a better idea of what I will be asking.

Are there other community members or area officials who you think we should speak with? May we tell them you provided use with his/her name?

Thank you for your willingness to speak with me. I will send you a copy of the questions and reconfirm our meeting time by __<date>__.
APPENDIX E

Participant Fact Sheet in Durham, NC

FACT SHEET for Interviews

**Title:** Exploring Policy Change in the Development of Community Trails

- The purpose of this interview is to explore inputs, activities, and outputs of the policy change process as they relate to the development of a community trail. We will be conducting interviews with members in the community who are involved or knowledgeable about policy and trail development in order to gain a better understanding of how the policy change process was achieved. Ultimately, we hope to identify key policy drivers that can be focused on by individuals and organizations to promote active community environments in the future.

- Your participation is completely voluntary. Jennifer Gilchrist (a graduate research assistant) or another member of the team will be conducting the interview. During the interview, you are free to refuse to answer any question that you choose, and you may elect to stop the interview at any time. Your decision about participating in the interview will have no effect on your employment.

- Your responses will remain confidential among the research team, located at both UNC and at St. Louis University (the coordinating center). Only the research team will be able to link your comments to your name.

- There is little risk to you for participation in this interview. You are in no way required to answer questions that make you feel uncomfortable and are free to end the interview at any time. Community members and the research community will benefit from increased understanding of the policy process in order to further future efforts to develop trails.

- The interview will be audiotaped to ensure that the research team does not miss any important information or detail you share. Audiotapes will be stored in a locked cabinet at the UNC Department of Epidemiology and will be erased or destroyed after data analysis has been completed. You have the right to request that the interview not be audiotaped.

- We anticipate that the interview will take less than one hour. The only cost to you is time. If you would like, we can send the interview questions to you in advance, which might shorten the interview even further.

- If you have questions about the nature of this project or your participation in it, please contact the principal investigator, Dr. Kelly Evenson at the University of North Carolina (919-966-1967) or by email to kelly_evenson@unc.edu.

- This project has been approved by the Institutional Review Board, University of North Carolina at Chapel Hill, CR#T097, Chapel Hill, NC 27599-7097, 919-966-3113, Email: IRB_Subjects@unc.edu.

APPROVED BY THE PUBLIC HEALTH IRB
THE UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL

APPROVED 2/17/04 EXPIRES 2/16/07

Cardiovascular Disease Program, Bank of America Center, 137 E. Franklin Street, Suite 306, Chapel Hill, NC 27514-3628
Phone: (919) 966-1967 * Fax: (919) 966-9800

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APPENDIX F

Participant Interview Guide in Durham, NC

Exploring Policy Change in the Development of Community Trails
- South Ellerby Creek Trail -

Interview Guide
Revised 3/13/06

Preparation for the trail

1. Who were the main people or entities involved in developing the South Ellerby Creek trail?
   • *Probe:* Individuals, community members/associations, non-profit organizations, trail groups, federal, state, local government agencies, contractors, other stakeholders?
     a. If there was an organized group, how did it come together?
     b. Was assistance needed from state or federal legislators for the development of the trail?
        • *Probes:* What type of assistance?
        • *How was it provided?*
        • *Was there a key legislator that championed the project?*
     c. What roles did each of the key groups play in the planning phase?
     d. Describe the relationships among these key groups during the planning, design, or construction phase.
        • *How well did they work together?*
        • *What types of negotiations occurred?*
        • *Do you have any suggestions of how to facilitate a better working relationship?*

2. Do these people or groups continue to be organized in support of the trail?

3. How were you involved with the planning and development of the South Ellerby Creek trail?

4. How did the trail emerge as a priority project?
   • *Probes:* *Was there an event or policy that led to the conception of the trail?*
   • *Who were supporters of the trail?*
   • *Was there any opposition? If so, what was opposed?*
   • *Was there a particular person who was especially important to the trail development?*
   • *Were there any special constraints on the project? (e.g., financial administrative, political, physical)*

5. When the trail was being developed, were there particular trail users in mind?
   • *Probe:* In what ways did you design for those users?
• How were you constrained by the demands of the non-users (e.g. motor vehicles, adjacent property owners) in meeting the needs of the trail users?

6. How long did it take to build the trail from conception to the actual opening? Please provide a summary of the timeline of trail development from your perspective.
   • Probe: Were there any schedule delays? If so, why?

Policies
7. What policies made it easier or facilitated the development of this trail?
   a. How was the land acquired for the trail? (If they do not mention it, ask: We learned of a 1988 subdivision ordinance that made many trails in Durham possible. Are you aware of this policy?)
      • Probes: Can you explain how it helped make the case of the S. Ellerby Creek Trail?
      • Were there issues surrounding land transfers from government, private or commercial land owners?
      • What were the issues and how were they addressed?
   b. Why was this policy originally proposed?
   c. Who instigated the policy, and what was the agenda of that person or group, or groups?
   d. How did the policy become a reality?
   e. What barriers had to be overcome to implement the policy?
   f. In what ways did this policy facilitate land acquisition for the trail?
   g. Were there issues surrounding land transfer from government, private, or commercial land owners? What were they and how were they addressed?
   h. What were some positive and negative aspects of the policy?

8. There also may have been policy challenges that needed to be overcome to build the trail. Are you aware of any other policies that made it difficult to develop this trail?
   • Probe: what phase of the trail development did these policies affect?

9. Is the trail part of any local, regional or state land use plans?
   • Probe: City Master Greenway plans, county ordinances, state plans like Mountains to Sea trail, other agendas?

10. Were any zoning issues involved in planning/developing the trail? If yes, what were they?

11. Were there any historic or environmental issues with respect to trail development and planning? If yes, what were they?
   • Probe: wetlands, open space, contamination etc.

12. Were there any design standards that had to be met? If so, what were they?
• *Probe: standards required by funding agency, ADA, local standards etc*

**Funding**

13. What were the major funding sources of your trail?
   - *Probe: How were these funds procured (e.g. grant writer, planner etc)?*
   - *In what order did you receive funding for the project?*

14. Were there competing priorities for funding? If so, what were they?
   - *Probe: How did community trail emerge as the funding priority?*

15. How does the City of Durham plan to address future funding needs for the trail?
   - *What group or groups will be involved?*
   - *Will citizen participation play a role, and if so, how?*
   - *Will state funding play a role?*
   - *If so, who advocates for state funds?*
   - *Other sources (e.g., grants, private donations, etc)?*

**Management and Maintenance**

16. Who is responsible for maintenance of the trail?
   - *Probe: Is this agreement long term or dependent on funding?*

17. How does citizen participation play into the ongoing use and life of the trail?

18. Are there liability issues surrounding maintenance of the trail? If so, what are they and how are they addressed?

19. What is the future vision for the trail (according to the city of Durham, Citizen groups, or other key groups)
   - *Probes: Any goals of connectivity, new programs associated with the trail, etc.*

**Safety**

20. How are the following types of safety being addressed?
   a. Personal safety crime
   b. Safety from injury on the trail
   c. Traffic when trails cross roadways

21. Do safety concerns impact the use of the trail? In what ways?

22. What would happen if the trail were to receive negative publicity? (e.g. an injury or crime happens along the trail).
   a. Is there an official agency that would respond? How would the community respond?
   b. What would the short term response be and what would the long term response be in this type of situation?
23. Do you think negative publicity has ever impacted use of the trail in the past or currently? How?

Other “Ps” from the 5 P Model:

24. Have there been any physical improvements (planned or completed) to the trail? If yes, how have these improvements come about?
   - Probe: regular grass mowing, call boxes along trail, lights along trail, zebra stripes painted or speed bumps placed where road intersects trail.

25. What strategies are used to promote use of the trail?
   - Probe: community organized events, pamphlets and guides, media highlights - print, radio, or TV, etc.
   b. Who conducts the promotional efforts?
   c. Are promotional materials made accessible to non-English speakers? How?
   d. How successful have promotional efforts been in promoting use of the trail?
   e. What could be done to make promotions more successful?

26. What types of on-going programs are currently associated with the trail? Be specific.
   - Probe: walking or biking groups, environmental education, commuter incentive programs, adopt-a-trail, recreational bike rides, crime prevention program, etc.
   b. What group or groups are responsible for running programs?
   c. How are minority groups included in program planning?
   d. What types of programs are the most successful?
   e. Which are the least successful and what could be done to make them more successful?

Perceptions and lessons learned

27. Are you aware of any beneficial effects of the trail? If so, what are they?
   - Probe: free place to exercise, beautification, pedestrian transportation, source of community pride.

28. Are you aware of any negative effects of the trail? If so, what are they?
   - Probe: monetary expense, disgruntled land owners, maintenance difficulties

29. What policy advice would you give to elected officials, agency staff, or community leaders who might be considering a trail like the one that you were involved with?

30. Is there anything else we haven’t talked about that you feel would be important to share?

31. Is there anyone else I should speak with to get more information about the trail?

Thank you for your time and insight!!
APPENDIX G

Trail Count Locations on American Tobacco Trail and North-South Corridor in Durham, NC

Trail count locations: 1 = Dunhill Drive; 2 = Riddle Road; 3 = Blackwell Avenue; 4 = Knox Street
APPENDIX H

Trail Count Locations on Waccamaw Neck Bikeway in Georgetown County, SC

Trail count locations: 1 = Trace Drive; 2 = Wilbrook Drive
APPENDIX I

Sample Comparison of Manual Counts versus Infrared Scanners, American Tobacco Trail, Durham, NC

<table>
<thead>
<tr>
<th>Location</th>
<th>Day</th>
<th>Date</th>
<th>Start</th>
<th>End</th>
<th>intervals</th>
<th>Manual</th>
<th>Scanner</th>
<th>Scanner %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dunhill</td>
<td>Thur</td>
<td>10 18 07</td>
<td>4:55 PM</td>
<td>6:50 PM</td>
<td>24</td>
<td>146</td>
<td>55</td>
<td>38%</td>
</tr>
<tr>
<td>Dunhill</td>
<td>Fri</td>
<td>10 19 07</td>
<td>6:55 AM</td>
<td>7:35 AM</td>
<td>9</td>
<td>8</td>
<td>4</td>
<td>50%</td>
</tr>
<tr>
<td>Dunhill</td>
<td>Sat</td>
<td>10 20 07</td>
<td>9:10 AM</td>
<td>10:55 AM</td>
<td>22</td>
<td>255</td>
<td>118</td>
<td>46%</td>
</tr>
<tr>
<td>Dunhill</td>
<td>Sun</td>
<td>10 21 07</td>
<td>9:40 AM</td>
<td>12:05 PM</td>
<td>30</td>
<td>232</td>
<td>177</td>
<td>76%</td>
</tr>
<tr>
<td>Dunhill</td>
<td>Sun</td>
<td>11 11 07</td>
<td>10:50 AM</td>
<td>12:45 PM</td>
<td>24</td>
<td>167</td>
<td>110</td>
<td>66%</td>
</tr>
<tr>
<td>Riddle</td>
<td>Thur</td>
<td>10 18 07</td>
<td>2:25 PM</td>
<td>4:25 PM</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Riddle</td>
<td>Sat</td>
<td>10 20 07</td>
<td>11:50 AM</td>
<td>1:35 PM</td>
<td>22</td>
<td>117</td>
<td>51</td>
<td>44%</td>
</tr>
<tr>
<td>Blackwell</td>
<td>Sat</td>
<td>10 20 07</td>
<td>4:25 PM</td>
<td>5:35 PM</td>
<td>131</td>
<td>925</td>
<td>515</td>
<td>56%</td>
</tr>
</tbody>
</table>

(131, 5-min intervals = 10 hrs 55 min)

Note: 925 trail users classified in 10.9 hours collected during 6 count sessions conducted in Oct./Nov. 2007. Data provided by Jeff Davis (2008).
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