ABSTRACT

EDWARDS, MICHAEL BRUCE. Place Disparities in Access to Supportive Environments for Extracurricular Sport and Physical Activity in North Carolina Middle Schools. (Under the direction of Dr. Michael Kanters and Dr. Jason Bocarro).

Although the causes are complex, decreased levels of leisure-time physical activity (LTPA) are often cited as a significant reason for increased rates of childhood obesity in the U.S. Because of individual economic and social disadvantages, as well as a lack of accessible public recreation resources, adolescents who live in rural areas may be especially at-risk for obesity. Research has shown that well-designed extracurricular physical activity programs in schools can improve the LTPA levels of these adolescents.

The purpose of this study was to determine whether local differences existed in access to supportive environments for extracurricular school physical activity for middle-school students in North Carolina. It also examined institutional and community systems that may influence the provision of LTPA opportunities. This study used Macintyre’s (2000) deprivation amplification model as a conceptual framework to examine differences in supportive environments for LTPA in middle schools. Because of fewer available recreation resources for adolescents in rural communities, schools are important to the delivery of LTPA programming. An investigation of disparities in access to supportive environments for extracurricular school LTPA programs was needed to understand the opportunities rural children have to be physically active.

The units of comparative analysis for this study were schools and their communities. Schools were clustered in school districts and therefore the analyses incorporated two levels. Through the use of multi-level modeling, the emergence of contextual place disparities at the school and community level as well as school district level was examined. Multiple sources of data (e.g., self-administered questionnaire to personnel at 325 public middle schools, N.C.
Department of Public Instruction school report cards, and U.S. Census FactFinder) were integrated to analyze place disparities in access to supportive environments for LTPA in North Carolina’s public middle schools. Aggregating environmental supports, a composite index for supportive environments was created for each school to use as a single dependent variable. Using multi-level modeling techniques to control for non-independence of schools clustered within school districts and to compare school/community-level (Level 1) and district-level (Level 2) influences on environmental support, regression models predicting environmental support from school compositional factors, community contextual resources, and collective social functioning were generated.

Study findings demonstrated that adolescents who live in more deprived rural areas in this sample had fewer environmental supports for extracurricular physical activity at their schools. These deficits were largely explained by a lack of economic resources. However, socio-cultural factors in rural areas may also influence the provision of school-based physical activity programs. More racially homogenous rural areas were more likely to overcome fiscal scarcity to offer broader physical activity programs, provide community access to school facilities, and partner with community organizations to support physical activities. School structure in rural areas was also associated with levels of environmental support. Lower levels of environmental support for extracurricular physical activity in rural schools may be a contributing factor to decreased LTPA and higher obesity rates observed in these areas.
Place Disparities in Access to Supportive Environments for Extracurricular Sport and Physical Activity in North Carolina Middle Schools.

by
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A dissertation submitted to the Graduate Faculty of North Carolina State University in partial fulfillment of the requirements for the degree of Doctor of Philosophy

Parks, Recreation, and Tourism Management

Raleigh, North Carolina
2009

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DEDICATION

This dissertation is dedicated to my wife Melissa - an amazing partner who supported me in more ways that anyone can imagine; and to our girls - who inspire me to make this world better.
BIOGRAPHY

Michael Edwards is a native of Johnston County in rural eastern North Carolina. He grew up in Princeton (population 1,066) and moved to the big city of Smithfield (population 11,500) at age 14. One of Michael’s most life-defining moments came in 1990 when, at age 16, he was selected to be a Rotary International Scholar in Blackburn, Lancashire, England. It was also soon after returning from England that Michael took a summer job with the Carolina Mudcats minor league baseball team. He enjoyed working behind the scenes at the ballpark, particularly the way in which games seemed to bring families and communities together. Following graduation from Smithfield-Selma Senior High School, Michael matriculated to the University of North Carolina at Chapel Hill where he majored in History. Most importantly, however, it was during his freshman year at Carolina that Michael met and fell in love with Melissa, whom he married in December 1998.

After graduation, Michael embarked on a decade-long career in professional baseball executive management. When he was hired as the general manager of the Burlington Indians, a Cleveland Indians minor league affiliate, he was the youngest general manager in Minor League Baseball. Michael proceeded to lead organizations in Columbus, GA, Lake County, OH, and Wilson, NC, receiving numerous awards including Executive of the Year on two occasions. However, Michael became increasingly frustrated with what he saw as a shift in organizational goals within minor league baseball from the development of social and
community capital in communities to profitability. At that time, he re-evaluated his personal
priorities and long-term career goals and decided to pursue a career as a professor.

Michael’s original intention was to pursue scholarship in sport management. His
master’s degree at East Carolina University, under the direction of Dr. Steve Estes, was in
this field. However, following his matriculation into Recreation, Parks, and Tourism
Management, and working closely with the faculty members at North Carolina State,
Michael became committed to research and scholarship that emerged from a wider
perspective of leisure, recreation, and physical activity than sport management could offer.
Developing from his interests in rural community development and social justice, Michael
saw in this field the opportunity to conduct scholarship in the context of sport and physical
activity that was relevant to societal issues and improved the quality of life for individuals
and communities.

In March, 2006, Michael and Melissa had their first daughter, Margaret James
(Molly) and have another daughter due in June, 2009. In the fall of 2009, Michael will begin
his career as an assistant professor in the Department of Recreation, Parks, and Tourism
Sciences at Texas A&M University.
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The completion of a Ph.D. would not be possible without the tremendous help and support I received during this process. At the top of the list must be my best friend and wife Melissa. With unbelievable patience (only a few times a day did she ask, “Why couldn’t you just be a banker?”), especially considering the morning sickness and hormones, she provided encouragement, perspective, support, editorial assistance, ‘work weekends,’ and much-needed motivational kicks in the rear. This was our journey together and everything I do is for us. If there is ever a spouse who deserves a P(utting) H(im) T(hrough), it is she. I also have to thank my daughter Molly - the source of unending joy in my life. For letting Daddy work on his ‘invitation’ in ‘Mr. McGregor’s Garden’ to providing essential escape during my graduate studies, you always let me know where my priorities should be and showing me what it truly means to play.

I must also thank my parents, Bruce and Rene Edwards. Although it took a while to realize, their influence on me is immense and I am appreciative for their shaping me into the person I am today. I am also thankful for their financial investment in me during the past few years during some pretty tough times. They believed in what I was doing and I hope I can make them proud.

There are numerous individuals at N.C. State that have assisted in many ways, large and small, over the past three years. My co-chairs Dr. Michael Kanters and Dr. Jason Bocarro have been brilliant and deserve tremendous credit for getting me here. I thank them
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There are several other individuals without whom I would not have been able to attempt graduate school or complete this research project. With the Wilson Tobs, I thank Greg Turnage, Dianne Wheeler, Steven Lawhorn, and Ben Jones. For their assistance in helping with this project, I thank Dr. Kymm Ballard, Dr. Emmy Domozych, Marla Mondora, Dr. Thom McKenzie, Eddie Reel, Brent Pearson, Lydia Crandall, John Glover and the numerous educators and professionals throughout North Carolina who are in the trenches every day trying to make kids’ lives better. You cannot be thanked enough.

I would like give my sincere appreciation to Active Living Research and the Robert Wood Johnson Foundation for providing the inspiration and financial support to conduct this research.

Finally, but certainly not least, I would like to thank God for the blessings He has given me.

We got it done – 320%!
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study design</td>
<td>117</td>
</tr>
<tr>
<td>Non-response analyses</td>
<td>122</td>
</tr>
<tr>
<td>Instrumentation</td>
<td>126</td>
</tr>
<tr>
<td>Measures</td>
<td>132</td>
</tr>
<tr>
<td>Dependent variables</td>
<td>134</td>
</tr>
<tr>
<td>Programs</td>
<td>135</td>
</tr>
<tr>
<td>Facilities</td>
<td>137</td>
</tr>
<tr>
<td>Inclusive policies</td>
<td>138</td>
</tr>
<tr>
<td>Community access and collaboration</td>
<td>140</td>
</tr>
<tr>
<td>School composite environmental support index</td>
<td>142</td>
</tr>
<tr>
<td>Explanatory variables</td>
<td>148</td>
</tr>
<tr>
<td>Community type</td>
<td>148</td>
</tr>
<tr>
<td>School composition</td>
<td>152</td>
</tr>
<tr>
<td>Community context and social functioning</td>
<td>155</td>
</tr>
<tr>
<td>Data Analysis</td>
<td>171</td>
</tr>
<tr>
<td>Chapter Summary</td>
<td>176</td>
</tr>
<tr>
<td>Chapter 4: Analysis and Results</td>
<td>177</td>
</tr>
<tr>
<td>Summary of Dependent Variable Items</td>
<td>178</td>
</tr>
<tr>
<td>Programs</td>
<td>178</td>
</tr>
<tr>
<td>Facilities</td>
<td>183</td>
</tr>
<tr>
<td>Inclusive policies</td>
<td>185</td>
</tr>
<tr>
<td>Community access and partnerships</td>
<td>185</td>
</tr>
<tr>
<td>Composite Environmental Support Index</td>
<td>187</td>
</tr>
<tr>
<td>Community Type</td>
<td>194</td>
</tr>
<tr>
<td>Explanatory Variables</td>
<td>200</td>
</tr>
<tr>
<td>Multicollinearity tests and solutions</td>
<td>204</td>
</tr>
<tr>
<td>Multi-Level Models</td>
<td>217</td>
</tr>
<tr>
<td>Primary analysis</td>
<td>217</td>
</tr>
<tr>
<td>Secondary analysis</td>
<td>228</td>
</tr>
<tr>
<td>Chapter Summary</td>
<td>230</td>
</tr>
<tr>
<td>Chapter 5: Discussion</td>
<td>232</td>
</tr>
<tr>
<td>Summary of Findings</td>
<td>233</td>
</tr>
<tr>
<td>Relationship between community location and supportive environments for extracurricular physical activity in middle schools</td>
<td>233</td>
</tr>
<tr>
<td>Relationship between school population characteristics and geographic differences in environmental support for extracurricular physical activity</td>
<td>234</td>
</tr>
<tr>
<td>Relationship between community contextual resources and geographic differences in environmental support for extracurricular physical activity</td>
<td>236</td>
</tr>
</tbody>
</table>
# LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 1</td>
<td>Physical and Psychological Consequences of Childhood and Adolescent Obesity</td>
<td>20</td>
</tr>
<tr>
<td>Table 2</td>
<td>National Center for Educational Statistics Locale Categories</td>
<td>71</td>
</tr>
<tr>
<td>Table 3</td>
<td>Grade Ranges for North Carolina Middle Schools</td>
<td>114</td>
</tr>
<tr>
<td>Table 4</td>
<td>Cross-tabulation of Community Type and Contact Type</td>
<td>125</td>
</tr>
<tr>
<td>Table 5</td>
<td>Study Variables</td>
<td>133</td>
</tr>
<tr>
<td>Table 6</td>
<td>Composite Environmental Support Index Variables</td>
<td>145</td>
</tr>
<tr>
<td>Table 7</td>
<td>Community Locale Classifications</td>
<td>152</td>
</tr>
<tr>
<td>Table 8</td>
<td>Number and Percentage of All Schools Offering Interscholastic Sports</td>
<td>180</td>
</tr>
<tr>
<td>Table 9</td>
<td>Number and Percentage of All Schools Offering Intramural Sports and Physical Activity Clubs</td>
<td>182</td>
</tr>
<tr>
<td>Table 10</td>
<td>Types of Indoor and Outdoor Facilities Available for Extracurricular Sports and Physical Activities</td>
<td>184</td>
</tr>
<tr>
<td>Table 11</td>
<td>Community Organizations That Schools Partnered With to Organize and Promote Extracurricular Physical Activities</td>
<td>186</td>
</tr>
<tr>
<td>Table 12</td>
<td>Composite Environmental Support Index Variables and Descriptive Statistics</td>
<td>188</td>
</tr>
<tr>
<td>Table 13</td>
<td>Total Variance Explained by PCA for Index Items</td>
<td>190</td>
</tr>
<tr>
<td>Table 14</td>
<td>Rotated Component Loading Matrix and Index Weights</td>
<td>192</td>
</tr>
<tr>
<td>Table 15</td>
<td>Mean and Percentage Comparisons of Individual Environmental Support Variables Based on Community Type</td>
<td>196</td>
</tr>
<tr>
<td>Table 16</td>
<td>Mean Comparisons of Environmental Support Index Items Based on Community Type</td>
<td>198</td>
</tr>
</tbody>
</table>
Table 17  Mean Comparisons and Descriptive Statistics of Composite Environmental Support Sores Across Community Type........................................199

Table 18  Descriptive Statistics and Descriptions for Explanatory Variables in Total Sample ........................................................................................................202

Table 19  Mean Comparisons of Explanatory Variables Across Community Type........203

Table 20  Correlations of Explanatory Variables to be Used to Predict Environmental Support for Extracurricular Sport and Physical Activity ........205

Table 21  Total Variance Explained by PCA for Explanatory Variables of Environmental Support for Extracurricular Sport and Physical Activity ....210

Table 22  Communalities of Variables Following PCA ..................................................212

Table 23  Rotated Component Loading Matrix for Explanatory Variables of Environmental Support for Extracurricular Sport and Physical Activity ....213

Table 24  Descriptive Statistics for Component Scores of Explanatory Variables Based on Community Type .................................................................217

Table 25  Hierarchical Linear Random Intercept Models Predicting Environmental Support from Community Type.................................................................220

Table 26  Hierarchical Linear Random Intercept Models Predicting Environmental Support from Community Type and Principal Components of Explanatory Variables........................................................................229

xii
LIST OF FIGURES

Figure 1  Theoretical model of personal-level and environmental correlates of LTPA participation .................................................................28

Figure 2  Conceptual model of how compositional factors, contextual resources, and social functioning influence environmental support for LTPA based on framework of deprivation amplification ..................................62

Figure 3  Prevalence of physical inactivity by community type and region ..........73

Figure 4  Map representation of schools that participated in this study ..............122

Figure 5  Conceptual model of the influence of school composition, contextual resources, and social functioning on environmental support for school LTPA at the community level including study variables ..........169

Figure 6  Scree plot of principal component analysis of environmental support Items .........................................................................................191

Figure 7  Histogram with normal curve of composite environmental support index ....194

Figure 8  Scree plot of principal component analysis of explanatory variables of environmental support ..............................................................211
CHAPTER 1: INTRODUCTION

Obesity has become an important societal issue in recent years. Of particular concern has been the dramatic increase in childhood and adolescent obesity in the United States, which has nearly tripled over the past 25 years for some age groups (Hedley et al., 2004; Reed, 2004). By some measures, 15.5% of children and adolescents in the U.S. are estimated to be obese and 30.1% are considered at-risk for obesity (Ogden, Carroll, & Flegal, 2008). Evidence also indicates disparities exist in the distribution of risk for childhood overweight and obesity. Females, racial and ethnic minorities, children with disabilities, and members of lower socio-economic status groups are more likely to be overweight or obese (Alfano, Klesges, Murray, Beech, & McClanahan, 2002; Gordon-Larsen, McMurray, & Popkin, 2000; Liou, Pi-Sunyer, & Laferrère, 2005; W. C. Taylor, Carlos Poston, Jones, & Kraft, 2006; World Health Organization, 2003). Children who live in the southeastern U.S. also have a higher risk of being overweight or obese than children living in other areas of the country (Singh, Kogan, & van Dyck, 2008).

Although the causes are complex, decreased levels of leisure-time physical activity (LTPA) among children worldwide are often cited as a significant reason for increased obesity rates (World Health Organization, 2003). Several theoretical models have been developed in an effort to understand and predict factors that influence rising rates of obesity. However, a growing interest in how physical and social environments facilitate or constrain opportunities for children and adolescents to engage in healthy behaviors, such as physical activity, has emerged in the literature over the past few decades (Diez Roux, 2001). The
influence of community and social environments on individual well-being has been a common theme in sociology since Durkheim’s (1966) analysis of suicide in the late 19th century (M.-A. Lee & Ferraro, 2007). In recent years, research across multiple disciplines, especially in epidemiology and, to a lesser extent, recreation and leisure studies, has emerged that examines how social and physical environments, analyzed at different levels (e.g., community, neighborhood, or school), influence LTPA (McNeill, Kreuter, & Subramanian, 2006). This perspective examines how individuals interact with their structural environments (Giles-Corti & Donovan, 2002; Kaczynski & Henderson, 2007). Stokols, Allen, and Bellingham (1996), for example, argued that behavior is influenced by layers of social and environmental interactions that can either facilitate or constrain healthy living in individuals. This movement reflects an overall trend in the social sciences to move beyond individualistic perspectives to an orientation that examines the influences of structural environments on individual behavior (Diez Roux; Macintyre, 2007; Macintyre, Ellaway, & Cummins, 2002). With respect to LTPA, personal-level explanations are only capable of partially explaining individual behavior (Henderson & Bialeschki, 2005). Increasingly, researchers have sought to identify the types of modifiable environmental features that encourage healthy lifestyles and how they are distributed across geographic space.

One trans-disciplinary approach for examining this relationship is the social ecological paradigm. Social ecological views of health behavior examine the interaction between individuals and their physical and social environments (Giles-Corti & Donovan, 2002; Kaczynski & Henderson, 2007). This movement reflects an overall trend in the social
sciences to move beyond individualistic perspectives to an orientation that examines the influences of structural determinants on individual behavior (Diez Roux; Macintyre, 2007; Macintyre et al., 2002). Stokols, Allen, and Bellingham (1996), for example, argue that behavior is influenced by layers of social and environmental interactions that can either facilitate or constrain healthy living in individuals. In the case of health behaviors that reduce the risk of obesity, the availability of proximal resources for LTPA, including facilities and programs, have been shown to be an important predictor of participation in physical activities (Estabrooks, Lee, & Gyurcsik, 2003). Some children, for example, may be more likely to engage in LTPA within structured programs that provide adult supervision (McKenzie, Marshall, Sallis, & Conway, 2000; Sallis et al., 2001). Though the private and commercial sectors are increasingly taking over the delivery of these programs in many communities (D. Scott, 2000), public sector programs such as those organized by schools and parks and recreation departments remain a critical way for many children, especially those from disadvantaged backgrounds, to access structured LTPA programs.

Although personal traits remain strong predictors of participation in LTPA, the social ecological approach suggests that environments, including where one lives, may be an important structural determinant of these behaviors (Macintyre, 2007). For example, public amenities for healthy lifestyles such as recreation facilities and programs may not be distributed, supported, and accessed equitably across specific social groups and geographic areas (Smoyer-Tomic, Hewko, & Hodgson, 2004). In many communities, commercial sector amenities provide a viable substitutable resource to offset these deficits (Dowda et al., 2007).
However, many areas also lack these facilities and in communities that do have adequate private sector resources, large segments of the population may not be able to access them. Currently, areas with higher concentrations of low-income and minority populations may have less access to environments that have the potential to encourage LTPA (Giles-Corti & Donovan, 2002; Macintyre et al., 2002; Smoyer-Tomic et al.; W. C. Taylor et al.). Although the presence of spatial health inequality in economically developed nations has been questioned in research (Macintyre, 2007), the U.S. has experienced economic and social residential segregation that is unique among advanced countries (Crowder & South, 2005). Therefore, U.S. residents may be more vulnerable to spatial health inequalities (Cummins & Macintyre, 2006). Lobao (2004) suggests that in the U.S. economic benefits, health status, education, and other markers of societal well-being often are unequally distributed across geographic space.

Macintyre (2000) proposes a model of deprivation amplification as a conceptual framework to examine health disparities across geographic space. Deprivation amplification, which is based upon Tudor Hart’s (1971) inverse care law, where “those most in need of services are least well provided with them” (Macintyre, 2000, p. 6), closely parallels ideas set forth in the concept of environmental justice (Macintyre, MacDonald, & Ellaway, 2008). Although inverse care is most often applied to the provision of health care services, Macintyre suggests that it is also applicable to health promotion. As a theoretical model, deprivation amplification suggests that the quantity and quality of accessible public resources that promote healthy lifestyles are lower within areas populated by socially and economically
disadvantaged groups than more advantaged areas (Macintyre, 2000, 2007). Macintyre argues that this process serves to amplify the individual constraints to active living faced by the residents of these areas. Conversely, one might argue, that this process may provide resources that offer some protective advantage to individuals from socially or economically disadvantaged groups who live in or within close proximity to more affluent areas (Estabrooks et al., 2003). More socially deprived areas often have fewer parks and green spaces, fewer sports fields and recreation centers, lower quality playgrounds for children, and more perceived threats to personal safety (Estabrooks et al.; Taylor et al., 2006). Additionally, these areas may have fewer organizations and programs to structure physical activities in the facilities to which they do have access.

Much of the research in this area has been descriptive in nature, documenting whether or not these place disparities exist (Diez Roux, 2001; Ellaway, Kirk, Macintyre, & Mutrie, 2007; Estabrooks et al., 2003; Hillsdon, Panter, Foster, & Jones, 2007; Macintyre et al., 2002). This research also focuses on compositional factors, which are the combined individual characteristics of people who are concentrated within a geographic area. However, place effects exist beyond those explained by population demographics. Few studies have examined how these disparities emerge. Macintyre and her associates (2002) suggest that disparities develop through two interrelated mechanisms, contextual and collective factors. Contextual factors refer to the physical environment, material infrastructure, and services provided to the local population (Macintyre et al.). These infrastructural resources and services are expected to be largely influenced by available
economic and human capital within a geo-political unit (Morton, 2003). Collective factors are collective social functioning and practices such as cultural norms, levels of social cohesion, socio-economic hierarchies, political practices, ideologies, history and traditions of an area.

Contextual factors are also shaped by collective social functions. Contextual effects, therefore, are often the visible manifestation of collective social practices. In heterogeneous communities, groups often differ in their access to social networks and power relations and therefore have differing levels of influences in the process of allocating community resources (Utter, Denny, Robinson, Ameratunga, & Watson, 2006). More homogeneous populations, with high collective social functioning (i.e., social capital) may be more likely to invest financial physical, and human resources in community programs (Luloff & Bridger, 2003; Wilkinson, 1991). Conversely, communities with large racial and ethnic divisions or high levels of economic inequality are expected to exhibit fewer examples of community development, such as public provision for facilities and programs for LTPA (Putnam, 2007; Wilkinson).

Most of the previous research examining spatial inequality related to health outcomes has tended to focus on inner cities. Despite romanticized bucolic images of rural life, significant gaps in economics, health, and other quality-of-life measures also exist between rural and urban areas (Brown & Swanson, 2003). Because of economic and social disadvantage found in many rural areas (Brown & Swanson), children and adolescents who live rural areas of the U.S. may be especially at-risk for overweight and obesity (Harrell,
Disparities associated with rurality are a product of the physical, social, and economic conditions inherent to these areas. For the rural South, individual factors are the key predictors of risk for overweight and obesity and physical inactivity. Specifically, this area is typically characterized by high African American (R. P. Harris & Worthen, 2003; Wimberley & Morris, 1997) and Latino populations (Saenz & Torres, 2003), persistent poverty, which is especially high among racial and ethnic minorities (Jensen, McLaughlin, & Slack, 2003), and low educational attainment (Lichter, Roscigno, & Condron, 2003). The concentration of these at-risk individuals within the rural South presents a compelling argument for the notion of spatial inequality in health-related behaviors in this region is solely a product of compositional factors. However, there are contextual and collective features of rural areas in the South that may further reduce opportunities for healthy behaviors.

Children and adolescents who live in the rural South may be less likely to have access to resources that promote physical activity and more likely to face transportation barriers than youth in other types of communities. Accessibility in this case, according to Smoyer-Tomic and her associates (2004), refers not only to geographic distance and financial costs of use, but to “social, cultural, and gender-based constraints as well” (p. 288). Equal access implies that individuals of all types of social and physical backgrounds have equal opportunities to use and participate in public programs and facilities that are of equitable quality. Rural communities often have relatively fewer and lower quality public and private recreation facilities to service their population (i.e., parks, sport fields, swimming pools, and
gyms) than suburban and urban areas (Churchill, Plano Clark, Prochaska-Cue, Creswell, & Ontai-Grzebik, 2007; Patterson, Moore, Probst, & Shinogle, 2004; Sanderson et al., 2003). More importantly, because of limited community and public resources, rural areas have difficulty providing physical activity programming to large segments of the population (Paluck, Allerdings, Kealy, & Dorgan, 2006).

The issue of mobility affects rural youth by increasing commute times to school, work, and leisure activities and thus reducing the available leisure time for physical activity. It also creates an increased burden upon the parents of non-driving adolescents that may reduce their support of participation in organized physical activities. Since rural communities rarely have provisions for public transportation systems, the distance between places in rural areas is a significant barrier to adolescents from low-income families with no or limited access to personal transportation (Churchill et al., 2007; McMeeking & Purkayastha, 1995). Longer commutes to jobs outside of the local area mean that residents have less time to participate in family and community activities (Putnam, 2000; Tigges & Fuguitt, 2003). Although school consolidation and employment migration has increased commute times in all community types, especially for low income residents, commute times are generally longer to school and work for residents of rural areas (Tigges & Fuguitt; Tonn, 2007).

The social-cultural characteristics, historical politics, and traditions of rural areas of the South, may also inhibit participation in sufficient LTPA, which leads to higher rates of overweight and obesity. Rural areas are generally characterized by more conservative values
that promote traditional gender roles. Rural girls, in fact, often face more significant social and structural barriers to LTPA participation than rural boys (Trost et al., 1997). Because of limited resources, schools and community organizations in rural areas may choose to sponsor sports and physical activities that are more appealing to male participants. For example, in a study that tracked national gender inequality in high school sport opportunities since the passage of Title IX, states with higher rural populations demonstrated lower levels of gender equity (Braddock II, Sokol-Katz, Anthony, & Lorrine, 2005). The ten states with the lowest gender equity in high school sports opportunities had a combined rural population twice that of the ten states with the highest gender equity. Adolescent girls also seek a wider variety of leisure-time physical activities than adolescent boys (Barr-Anderson et al., 2007) and prefer lifelong and cooperative activities that allow for increased social interaction among peer groups (Felton et al., 2002; Sirard, Pfeiffer, & Pate, 2006). By limiting programs in the school or community to a few competitive team sports, rural areas may also exclude many interested females from participating in structured LTPA.

Other groups, such as racial and ethnic minorities and members of lower SES groups may also face socio-cultural and institutionalized barriers to participation in LTPA in the South. Historical and continual exclusion of these groups from public and commercial places in the rural South left a durable legacy of these groups not feeling welcome to participate in traditional community programs (Glover, 2007; P. A. Goldsmith, 2003). Additionally, local rural policy-makers often make decisions that favor one set of special interests over others, rather than benefiting the entire community (G. P. Green, 2003). Since the process of
distributing community resources may be controlled by local power elites and closed to marginalized groups, it may be more difficult to create new public programs or accessible opportunities for historically excluded populations in rural areas. Floyd and Johnson’s (2002) argument about the politics of outdoor recreation resources being driven by White, middle-class interests is particularly salient when considering the politics of all public recreational resources in rural areas. When rural communities, such as in the Midwest, Northeast, and parts of the West have more homogenous social structures and populations, they may have more democratic processes for community development and resource allocation (Swanson & Brown, 2003). When rural communities are more heterogeneous and socially unequal, like in the “Black Belt” South, the special interests of social elites often inhibit widespread community action and involvement as well as the equitable distribution of public resources (Wilkinson, 1991).

The differences in rural and urban environments that support LTPA in adolescent populations suggest that effective strategies for increasing LTPA will also be different. Policies and programs that fail to recognize rural communities represent a drastically different design from urban and suburban forms may be ineffective in these areas (M. C. Nelson et al., 2006). Since active transportation and natural social interaction is not always possible in rural areas, organized sport and physical activity programs are significantly more important than in suburban and urban communities (J. B. Moore, Davis, Baxter, Lewis, & Yin, 2008). For most adolescents, schools represent an important setting for interventions to increase LTPA. A large amount of adolescents’ daily lives are spent in public school
facilities, participating in school programs, and interacting with school personnel. Through patterns of contact, adolescents are generally familiar and comfortable with their own school environments (Wechsler et al., 2000). Schools, therefore, are uniquely situated to provide supportive LTPA environments for a large number and diverse range of adolescents through their use of curricular and extracurricular programming, access to school-owned facilities such as gymnasiums and fields, the employment of trained physical education professionals, and existing transportation systems (Centers for Disease Control and Prevention, 1997; Cleland et al., 2008; Cohen, Scott, Zhen Wang, McKenzie, & Porter, 2008; Felton et al., 2002; Floyd, Bocarro et al., 2008; Lobstein et al., 2004; Lounsbery et al., 2007; McNeill et al., 2006; Sallis et al., 2001; Wechsler et al., 2000; World Health Organization, 2003; Young et al., 2007). Public school systems also have opportunities to bridge gaps in the public recreation across communities by partnering with organizations to maximize physical resources such as facilities and offer a broader array of activities (Estabrooks et al., 2008; McKenzie, 2001; Trost et al., 1997). Research has shown that well-designed extracurricular sport and physical activity programs in schools can improve the physical activity levels and social well-being of adolescents (Cohen, Taylor, Zonta, Vestal, & Schuster, 2007; Wechsler, Devereaux, Davis, & Collins, 2000). Schools may be ideally positioned in rural areas to provide structured environments that promote healthy activities for all children (Felton et al., 2002; Wechsler et al.; Young et al.).

Unfortunately, rural schools, like those found in many inner cities, are often disadvantaged in terms of funding and available human capital for extracurricular physical
activity and sport opportunities compared to suburban schools (Eitzen, 1996). Both school
systems and community parks and recreation departments rely on local funding sources that,
with a limited tax base, are often inadequate in rural areas. Wilcox et al. (2000) found that
rural areas lack many of the public resources for recreation found in more urbanized
communities. Public parks and recreation departments in rural communities may also
prioritize resources for LTPA towards older adults and younger children, rather than
adolescents (Bocarro et al., 2009). Rural communities, therefore, may be more likely than
those in other areas to stop offering recreational programs to adolescents after they enter the
middle grades (McMeeking & Purkayastha, 1995). At the same time, many secondary
schools focus extracurricular programming towards interscholastic sports for elite athletes
over more inclusive programs such as intramurals or non-competitive physical activities
which are open to all students in the middle grades (Loucaides, Plotnikoff, & Bercovitz,
2007). If few school-sponsored physical activity programs exist and are only open to a
school’s best athletes, many adolescents in rural areas may be excluded from participating in
any structured LTPA program. The school, therefore, becomes critical to the delivery of
physical activity programming to adolescents in rural communities. An investigation of
disparities in access to structured school-sponsored LTPA environments, with schools as the
level of analysis, is important to building an understanding of the opportunities rural children
have to be physically active.

Based upon the factors outlined by the deprivation amplification model, this study
seeks to examine whether children and adolescents who live in rural areas may be further
disadvantaged because they attend schools with less environmental support to facilitate LTPA compared to similar adolescents living in non-rural areas. Despite the enormous gaps in health outcomes between rural and non-rural areas, rural populations and communities have been considerably understudied in research related to health and physical activity (M. C. Nelson et al., 2006). This study focuses on middle school students because little research has been conducted addressing sport and physical activity opportunities among adolescents in middle grades (Hawkins & Mulkey, 2005; McKenzie, 2001). This oversight is particularly troubling considering the increase in sport attrition and increased levels of physical inactivity among middle school-aged adolescents (Petlichkoff, 1996). School-sponsored sport and physical activity programs are important environments to increase physical activity among adolescents. The quality of opportunities for sport and physical activity are a critical mediator at this stage of adolescence for keeping young people engaged in LTPA into adulthood (Curtis, McTeer, & White, 1999; MacPhail & Kirk, 2006). However, beyond student enrollment in curricular physical education, little is known about the available opportunities for middle school students to be physically active in school-sponsored programs (Lounsbery, Bungum, & Smith, 2007). Additionally, assessments of physical activity in school environments have tended to focus on the availability of facilities, active transportation, and curricular physical education. A baseline understanding of the extent of extracurricular sport and physical activity opportunities that are currently being offered to middle school students is imperative to better inform policy makers.
Study Purpose

The purpose of this study is to determine whether local differences exist in access to supportive environments for extracurricular school physical activity for middle-school aged adolescents in North Carolina. It will also examine the key institutional and community systems that influence the provision of LTPA opportunities. This study will employ Macintyre’s model of deprivation amplification to investigate the relationship between compositional, contextual, and collective factors and spatial disparities in access to public LTPA programs in North Carolina. Specifically, this study seeks to determine whether adolescents living in rural areas of North Carolina attend schools with less supportive environments for LTPA that those in more urban communities. Through this analysis, I hope to examine how variation in environmental support for LTPA in schools is related to school composition, community economic context, and social functioning. The results of this study will measure school environmental support for LTPA by documenting the available programs as well as the inclusive or exclusionary characteristics of programs that have the potential to get adolescents physically active. Environmental support is defined as the school attributes (e.g., programs, practices, resources, and policies) that create conditions that may support higher levels of student participation in extracurricular sport and physical activity (Macintyre et al., 2002; McNeal Jr, 1999; Young et al., 2007). These results may demonstrate that schools and communities with large socially and economically disadvantaged populations, particularly in rural areas, have fewer opportunities for important structured LTPA. Therefore, the specific research questions (RQ) guiding this study are:
RQ1. Do differences in supportive environments for extracurricular sport and physical activity in middle schools exist based upon community location?

RQ2. Are spatial differences explained by compositional characteristics of school populations? If so, what school population characteristics (i.e. enrollment, racial composition, school type, and school SES) predict differences in environmental support for extracurricular sport and physical activity?

RQ3. Controlling for school compositional factors, what aspects of community contextual resources (i.e. economic base) both at the district level and school level influence environmental support for school LTPA programming?

RQ4. Controlling for school compositional factors, what aspects of community collective social functioning (i.e., income inequality, racial heterogeneity, education level, and average commute time) influence environmental support for school LTPA programming?

RQ5. How do school composition, community context, and collective social functioning combine to predict place disparities in access to supportive school environments for LTPA?

Chapter Summary

LTPA programming is a critical strategy for reducing childhood obesity. Because of fewer recreation resources for adolescents in rural communities, schools are important to the delivery of LTPA programming. An investigation of disparities in access to extracurricular school LTPA programs is important to understanding the opportunities rural children have to
be physically active. In this study, Macintyre’s (2000) deprivation amplification model is used to examine how community context and social functions influence the distribution of supportive environments for LTPA in middle schools. The underlying goals of this study are to contribute information that will expand the knowledge base about accessibility to physical activity programming in schools and how spatial inequality related to health operates on a regional level. Though evidence has been put forward that describes the existence of place disparities in access to community resources for physical activity, little is known about how this phenomenon emerges in school environments or what characteristics of schools and communities influence the development of this inequality. This study may demonstrate that significant disparities in access to supportive environments for LTPA exist between geographic areas in the state of North Carolina and could provide justification for targeted investments in school and facilities, equipment, personnel, and programming to promote adolescent physical activity. These results may also assist states throughout the South in developing policies that maximize resources to increase accessibility to physical activity programs in rural areas for a greater number of adolescents at risk for obesity and its related health problems.
CHAPTER 2: REVIEW OF LITERATURE

The purpose of this study is to determine whether local differences exist in access to supportive environments for extracurricular school physical activity for middle-school aged adolescents in North Carolina. It will also examine the key institutional and community systems that influence the provision of LTPA opportunities. LTPA programming is a critical strategy for reducing childhood obesity. Because of fewer recreation resources for adolescents in rural communities, schools are important to the delivery of LTPA programming. An investigation of disparities in access to supportive environments for extracurricular school LTPA programs is important to understanding the opportunities rural children have to be physically active. This study uses Macintyre’s (2000) deprivation amplification model to examine differences in supportive environments for LTPA in middle schools. The underlying goals of this study are to a.) contribute information that will expand the knowledge base about accessibility to physical activity programming in schools and b.) understand how spatial inequality related to health operates on a regional level. Though evidence has been put forward that describes the existence of place disparities in access to community resources for physical activity, little is known about how this phenomenon emerges in school environments or what characteristics of schools and communities influence the development of this inequality. This study may demonstrate that significant disparities in access to supportive environments for LTPA exist between geographic areas in the state of North Carolina and could provide justification for targeted investments in school and facilities, equipment, personnel, and programming to promote adolescent physical
activity. These results may also assist North Carolina and other states in developing policies that maximize resources to increase accessibility to physical activity programs in rural areas for a greater number of adolescents at risk for obesity and its related health problems.

As relevant to the current study, this review of literature is organized into the following sections: a.) Childhood obesity and leisure-time physical activity as prevention, b.) physical activity and childhood obesity, c.) Deprivation amplification as a framework for studying place disparities in access to supportive environments for LTPA, d.) rural and urban differences, and e.) school environments for LTPA.

Childhood Obesity and LTPA as Prevention

Childhood obesity is recognized as a serious health problem facing American society (Benson, Baer, & Kaelber, 2009; Zapata, Bryant, McDermott, & Hefelfinger, 2008). The Centers for Disease Control and Prevention (CDC) define the condition of obesity in children as having a body mass index (BMI), measured as weight divided by height, at or above the 95th percentile for age (Ogden et al., 2008). The CDC also recognize children with BMIs at or above the 85th percentile for age as at-risk for obesity (Ogden et al.). The rates for childhood obesity have increased considerably in the past three decades, quadrupling in school-aged children during that time (Benson et al.; Cawley, Meyerhoefer, & Newhouse, 2007; Estabrooks, Fisher, & Hayman, 2008). By some measures, 15.5% of children and adolescents in the U.S. are estimated to be obese and 30.1% are considered at-risk for obesity (Ogden et al.). Based on their reliance on self-reports and inconsistent medical data, Benson suggests that these figures may be underreported. Although the dramatic increase in
childhood obesity over the past three decades has been well-documented, what has most concerned health advocates is the disproportionate representation of some population groups compared to others among the obese and at-risk for obesity.

In almost every health indicator, including obesity rates, children from racial and ethnic minorities do worse than non-Hispanic whites (Blacksher, 2008). Childhood obesity may affect as many as 1/3 of socially disadvantaged children (Blacksher). In general, African Americans and Latinos, especially females and children of lower socio-economic status (SES), are more likely to be overweight or obese than their white, more affluent peers (Alfano et al., 2002; Gordon-Larsen et al., 2000; Liou et al., 2005; W. C. Taylor et al., 2006; Voss, Hosking, Metcalf, Jeffery, & Wilkin, 2008; World Health Organization, 2003).

The increased rates of childhood obesity have been accompanied by increased risk for obesity-related health problems. Obese children are more at-risk for hypertension, type-2 diabetes, some forms of cancer, asthma, and other chronic diseases (Ellaway et al., 2007; Lobstein, Baur, & Uauy, 2004; Mokdad et al., 2003; Must et al., 1999). In addition to these physical consequences, obese and overweight children and adolescents often suffer from higher levels of depression, lower self-esteem, social isolation, and a generally poorer quality-of-life in comparison to their peers (Daniels et al., 2005; J. E. Jackson, Doescher, Jerant, & Hart, 2005). Table 1 presents a wide range of conditions, derived from clinical studies, for which obese children and adolescents are at greater risk.
Table 1

*Physical and psychological consequences of childhood and adolescent obesity*

<table>
<thead>
<tr>
<th>Pulmonary</th>
<th>Sleep apnea</th>
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<tr>
<td></td>
<td>Asthma</td>
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<td></td>
<td>Pickwickian syndrome (hypoventilation)</td>
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<td>Orthopedic</td>
<td>Slipped capital epiphysis (growth plate)</td>
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<td></td>
<td>Blount’s disease (tibia vara/bowleg)</td>
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<td></td>
<td>Tibial torsion</td>
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<td></td>
<td>Flat feet</td>
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<td></td>
<td>Ankle sprains</td>
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<td></td>
<td>Increased risk of fractures</td>
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<tr>
<td>Neurological</td>
<td>Idiopathic intracranial hypertension (pressure around brain)</td>
</tr>
<tr>
<td>Gastroenterological</td>
<td>Cholelithiasis (gallstones)</td>
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<tr>
<td></td>
<td>Liver steatosis (non-alcoholic fatty liver)</td>
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<tr>
<td></td>
<td>Gastro-esophageal reflux (acid reflux)</td>
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<td>Endocrine</td>
<td>Insulin resistance/impaired glucose tolerance</td>
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<td></td>
<td>Type-2 diabetes</td>
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<td></td>
<td>Menstrual abnormalities</td>
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<td>Polycystic ovary syndrome</td>
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<td>Hypercorticism</td>
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<td>Cardiovascular</td>
<td>Hypertension</td>
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<td>Dyslipidaemia</td>
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<td></td>
<td>Fatty streaks (plaques)</td>
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<td>Left ventricular hypertrophy</td>
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<tr>
<td>Psychological</td>
<td>Depression</td>
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<tr>
<td></td>
<td>Poor quality of life</td>
</tr>
<tr>
<td>Other</td>
<td>Systemic inflammation</td>
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Note: Adapted from Lobstein, Baur, and Uauy (2004) and Kumanyika et al. (2008) to include vernacular where appropriate.
Because lifestyles and health behaviors are shaped in childhood, rates of childhood obesity may also be a strong predictor of rates of adult obesity. It has been reported that anywhere from 40% to 80% of obese children become obese adults (Whitaker, Wright, Pepe, Seidel, & Dietz, 1997; Zapata et al., 2008). The predicted increase in adult obesity that may emerge from the rapid increase of childhood obesity brings an increasing concern about personal and public economic and health costs and the expected burden on the U.S. health care system (Rosenberger, Sneh, Phipps, & Gurvitch, 2005; U.S. Department of Health and Human Services, 2001). Billions of dollars are expected to be lost annually in reduced worker productivity attributable to obesity (Trogdon, Finkelstein, Hylands, Dellea, & Kamal-Bahl, 2008). Additionally, individual medical expenses are reportedly 40% higher for obese patients compared to patients in normal weight ranges (Finkelstein, Fiebelkorn, & Wang, 2004; Wee et al., 2005). Additionally, annual obesity-attributable U.S. medical expenditures between 2001 and 2003 were estimated to be $75 billion, half of which was financed by tax dollars (Finkelstein et al.). Based on current projections, total health care costs that can be attributed to obesity and overweight may double every decade by 2030, with cost reaching as high as $950 billion, or 18% of the total national health care costs (Wang, Beydoun, Liang, Caballero, & Kumanyika, 2008).

Disparities in obesity risk. Some groups of children may be more at risk for obesity than others. While increases in obesity rates have been experienced in all corners of society, racial and ethnic minorities, females, children with physical disabilities, and individuals from low socio-economic groups may be the most at risk of overweight and obesity (Alfano et al.;
Blacksher, 2008; Hedley et al., 2004; Liou et al., 2005; T. F. Nelson, Gortmaker, Subramanian, Cheung, & Wechsler, 2007; World Health Organization, 2003). In general, African Americans and Latinos, especially females and children of lower socio-economic status, are more likely to be overweight or obese than their white, more affluent peers (Alfano et al.; Gordon-Larsen et al., 2000; W. C. Taylor et al., 2006). The highest levels of obesity were reported among non-Hispanic Black girls and Mexican-American girls and the lowest levels were reported among Whites (Ogden et al., 2008). In 2000, for example, the CDC reported that over one-fourth (25.7%) of Black girls were classified as overweight (compared to just 12.2% of White girls, 20.5% of Black boys, and 13% of White boys) (Layden, 2004). Childhood obesity may affect as many as 1/3 of socially disadvantaged children (Blacksher).

There are several suggested explanations for why racial and ethnic minorities are more likely to experience overweight and obesity. Day (2006) provides a summarization of these arguments. First, the physiology and body composition of racial and ethnic minorities may make them biologically more predisposed to being overweight. It is important to note that until 40 years ago, white children were more at-risk for being overweight than racial and ethnic minorities (Richmond, Hayward, Gahagan, Field, & Heisler, 2006). Thus, biological explanations seem unlikely taken on their own. Second, racial and ethnic minorities may have different socially constructed attitudes toward physical culture and body image. Third, the traditional diets of these groups, particularly African Americans and Latinos, have high fat contents. Fourth, based on socio-economic conditions and community location, these
groups may be more likely to experience some level of food insecurity; that is the absence of local food sources. Finally, for reasons discussed later in this chapter, racial and ethnic minorities have lower rates of physical activity. Like in all populations, the causes of obesity are complex. These explanations are not mutually exclusive nor can any one of them be isolated as a more significant cause of disproportionate rates of overweight and obesity among racial and ethnic minorities.

Obesity is a “multifactorial phenomenon” (Young et al., 2007, p. 42). Weight gain leading to overweight and obesity is primarily caused by a caloric imbalance (Estabrooks et al., 2008; Wells, Ashdown, Davies, Cowett, & Yang, 2007). That is, individuals take in more calories than they can burn. Therefore, in the simplest terms, there are two approaches to treating or preventing childhood obesity: reducing energy intake (i.e., healthier food choices) or increasing energy expenditure (i.e., more physical activity) (Ara et al., 2006). Programs designed to encourage healthier, low-calorie diets among children and adolescents are one way in which treatment and prevention of obesity may be implemented (Lobstein et al., 2004). However, the maintenance of healthy diets is more difficult outside of controlled settings (Ara et al.) and adolescents may be more resistant to these types of interventions than younger children (Lobstein et al., 2004; Suarez-Balcazar et al., 2007). Another way in which obesity treatment and prevention has been approached is through pharmacological methods (e.g., prescribed or over-the-counter appetite suppressors, fat absorbers, or hormones) (Lobstein et al.). The ability of pharmaceutical and medical techniques to prevent or treat obesity in childhood is inconsistent and the risks of further medical complications often
outweigh the rewards (Lobstein et al.). Because of the difficulties of reducing energy intake and concerns over pharmacological approaches, many researchers have suggested the best approach to reducing rising levels of childhood obesity is increasing energy expenditures (Ara et al.; Benson et al., 2009; Cawley et al., 2007; Rosenberger et al., 2005).

Physical Activity and Childhood Obesity

A significant part of achieving the caloric balance necessary to prevent unhealthy weight gain is through physical activity (World Health Organization, 2003). Physical activity is defined as “bodily movement produced by skeletal muscles that result in energy expenditure” (Caspersen, Powell, & Christenson, 1985, p. 126). Physical activity can be further delineated by the intensity of activity (i.e., light, moderate, or vigorous), based upon the participants level of exertion, as well as by type (i.e., compulsory or leisure-time) (Ainsworth et al., 2000; Caspersen et al.). Though no widely accepted definitions of physical activity types are available, compulsory physical activity is often differentiated from LTPA. Compulsory physical activity is required and is often associated with occupational physical activity or physical activity that serve a utilitarian purpose (Caspersen et al.; Sofi et al., 2007). Conversely, LTPA is assumed to be voluntary and occurs as recreation and can be participated in for enjoyment, for its own sake, or with a purpose (Caspersen et al.; Henderson & Bialeschki, 2005; Kaczynski & Henderson, 2007; Sofi et al.). Lack of physical activity is a direct antecedent to obesity (Cawley et al., 2007; Rosenberger et al., 2005) and strong correlations are often found between rates of obesity and rates of physical inactivity (Brock et al., 2009). Physical inactivity is also an important public health issue beyond
increasing rates of obesity (Floyd, Spengler, Maddock, Gobster, & Suau, 2008). While physical activity modifies levels of obesity (Ara et al., 2006), increased rates of physical activity have been shown to decrease health risks, even after controlling for BMI (Blair & Brodney, 1999; Cawley et al.). Thus, physical inactivity may be independently as important as obesity in increasing health risks among the U.S. children and adolescents (World Health Organization, 2003). Rosenberger et al. (2005) suggest that recreation and leisure time are interconnected with health status. Though the research is limited, voluntary participation in LTPA has been shown to reduce the risk of obesity and promote long-term participation in physical activity better than compulsory (Cleland, Dwyer, Blizzard, & Venn, 2008; Kristjansdottir & Vilhjalmsson, 2001) or occupational (Sofi et al.) physical activity.

For most children and adolescents, physical activity occurs as LTPA. The CDC (2008b) recommend that children and adolescents have 60 minutes or more of physical activity each day. They suggest three types of physical activities: aerobic activity to increase heart and breathing rates (e.g., brisk walking or running), muscle strengthening (e.g., gymnastics or push-ups), and bone strengthening (e.g., jumping rope or bicycling). Decreased levels of LTPA among children worldwide are often cited as a significant reason for increased obesity rates as they enter adolescence and adulthood (WHO, 2003). A sharp decline in levels of physical activity has been observed as children enter adolescence (McKenzie, 2001). While approximately 3/4 of middle school students report participating in LTPA during a typical week (Zapata et al., 2008), it is estimated that only 35% of adolescents meet the CDC’s recommended guidelines (Centers for Disease Control and
Prevention, 2008a). Improving rates of LTPA among children and adolescents may be the best strategy to prevent childhood obesity (Ara et al., 2006; Committee on Prevention of Obesity in Children and Youth, 2005; U.S. Department of Health and Human Services, 2000). Additionally, promoting LTPA among youth provides a foundation to encourage active lifestyles and a correlated range of physical, social, and mental health benefits in adulthood (E. L. Jackson & Scott, 1999; World Health Organization, 2003). Because of the suggested role of adolescent participation in LTPA as a mediator between childhood LTPA and adult LTPA (Scheerder et al., 2006), it is important to understand the opportunities adolescents have to be physically active.

Adolescent participation in LTPA. With an increased call for intervention strategies to promote LTPA comes a need to explore why adolescents engage or do not engage in physical activity. The reasons adolescents participate in LTPA are complex and often hard to determine (Sallis, Prochaska, & Taylor, 2000; Thompson, Rehman, & Humbert, 2005). Adolescents participate in both structured and unstructured LTPA, although adolescents are less likely than younger children to participate in unstructured physically active play (Sallis et al., 2001). Additionally, while some adolescents are physically active through forms of active transportation (e.g., walking or bicycling) (P. F. Pearce, Harrell, & McMurray, 2008), Sallis et al. (2001) suggest that some adolescents are more likely to be physically active when adult supervision is present and in structured activities. Although to get the full picture of adolescent participation in LTPA, consideration must be given to the type and extent of participation, as well as individual demographics and other contextual life factors such as
neighborhood type, (A. Smith, Green, & Roberts, 2004), organized, structured activities appear to have potential for increasing overall physical activity among youth (Dishman, Sallis, & Orenstein, 1985; M.-A. Lee & Ferraro, 2007; Young et al., 2007).

Two theoretical perspectives have emerged in the study of adolescent participation in LTPA: Personal-level and Environmental. King et al. (2002) provides an overview of these two conceptual approaches. They suggest personal-level perspectives are choice-driven, with a focus on individuals and surrounding social influences, while environmental perspectives are choice-enabling, that is they suggest the existence of contextual situations that support or hinder individuals’ participation in physical activity. In reality, personal-level and environmental determinants of physical activity participation are not mutually exclusive. Instead, these influences are highly interconnected. Before describing the previous research from both of these perspectives, an overview of how personal-level and environmental factors may collectively influence participation in LTPA is presented visually in Figure 1.
Figure 1. Theoretical model of personal-level and environmental correlates of LTPA Participation. Adapted from Greves et al. (2007) to include broader correlates of all LTPA participation.
**Personal-level approaches to LTPA participation.** Personal-level approaches in the research related to sport and physical activity follow from the traditions of early leisure theorists (e.g., see Csikszentmihalyi, 1990; Iso-Ahola, 1980; Neulinger, 1981) who developed highly-individualized theoretical perspectives. This perspective focuses on psychological, social, and demographic aspects of individuals and often employs social-psychological approaches (Giles-Corti & Donovan, 2002; King et al., 2002). Social-psychological approaches, which allow for the influence of environmental factors on individuals, dominate leisure research (Hemingway & Parr, 2000; Henderson & Bialeschki, 2005). The most prevalent theoretical framework that emerged from this tradition focuses on individual motivations of adolescents. This perspective assumes that, though external environments influence decisions, people are self-motivated to intentionally act based upon cognitive or emotional responses (Newton, Watson, Kim, & Beacham, 2006). For Iso-Ahola (1999), leisure processes are fundamentally about intrinsic motivation. Psychologically-based intrinsic motivation, therefore, is the primary guiding influence to participation in leisure activities (Iso-Ahola, 1980). This perspective provides the foundation for two principle theories of motivation: self-determination theory (Deci & Ryan, 1985; Iso-Ahola, 1980, 1999) and achievement goal theory (Nicholls, 1984).

This framework has generally found high levels of autonomous self-motivation and the satisfaction of intrinsic needs related to competency among a wide range of recreational sport and physical activity participants (Markland, 1999; McDonough & Crocker, 2007; Standage, Sebire, & Loney, 2008). Nicholls (1984) further suggested that individuals are
motivated through two types of concepts of success. When they are motivated by the
development of skill, mastery, or competence, they are task-oriented. When they are
motivated by achievement in comparison to others, they are ego-oriented. Often researchers
make the conceptual leap, whether correctly or not, that goal orientations reflect levels of
intrinsic or extrinsic motivation. The overarching proposition of the application of
achievement goal theory to sport is that individuals who are task-oriented are more likely to
seek out recreational sport opportunities that are less competitive and more skill-oriented
(Newton et al., 2006). Conversely, individuals who are ego-oriented are expected to pursue
more competitive activities.

Because self-determination and achievement goal models fail to adequately account
for social factors that lead to motivation, many researchers have adopted approaches that use
Ajzen’s (1991) theory of planned behavior. A measure of intention, the theory of planned
behavior is an adaptation of Ajzen’s earlier theory of reasoned action. Taking the earlier
theory’s constructs of attitudes and subjective norms, he added the concept of perceived
behavioral control, a derivative of the social cognitive ideas of self-efficacy (Bandura, 1986)
and locus of control (Ajzen, 2002). Its appeal is based in its intuitive logic: if an individual
likes an activity (attitudes), believes he or she can competently participate in that activity
without restriction (perceived behavioral control), and significant others support
participation, he or she is more likely to demonstrate an intention to participate.

Social cognitive theory (Bandura, 1986), which was developed from Rotter’s (1954)
social learning theory, suggests that individual behavior and motivation is shaped through the
interrelationship of interpersonal, cognitive, and environmental factors. By including external environmental influences, social cognitive theory accounts for the role that outsiders play in shaping beliefs and perceptions about participation in recreational sport or physical activity (Byunggook, 2008; Sylvia-Bobiak & Caldwell, 2006). While self-determination theory and the theory of planned behavior often suppress the impact of social interaction in determining self-motivation (Beaton & Funk, 2008), social cognitive approaches have found social support to be a key predictor of participation (J. J. Martin & McCaughtry, 2008). Using the same foundation, social support theory has been used to show the importance of significant others, particularly family and friends, in shaping self-motivation to be physically active (Anderson, Wozencroft, & Bedini, 2008).

Within personal-level approaches, micro-environmental frameworks (King et al., 2002) recognize that social and structural contexts within society shape human behavior. The socialization process for adolescents, rather than individual motivation, becomes the subject of interest (Hollinger, 1994). Similar to social-psychological frameworks, this approach is interested in how individuals become involved in recreation, sport and physically active leisure, drawing its theoretical basis from social learning theory (Butcher, 1985; Mannell & Kleiber, 1997). However, this framework focuses on the process of how individuals interact with different agents within their environment, and across their lifespan, to shape their attitudes toward participation. One of the earliest influential models of sport socialization was developed by Kenyon and McPherson (1973). They proposed three broad elements of the socialization process: personal attributes, significant others, and socialization
situation. According to their model, each of these three inter-correlated components contributes directly to the role learning process of children that leads to how they participate in sport and physical activities. The simplicity of their model belies the complexity of studying this process from a socialization perspective. The biggest challenge for researchers is how to meaningfully capture all of the factors related to socialization with a manageable number of variables (Kenyon & McPherson). This issue has plagued socialization research for a long time. For example, Butcher (1985) included 13 different constructs in her test of this model. With the practical issues of collecting data and conducting research, this aspect has led many researchers to focus their examinations exclusively on one component of socialization.

Another way in which researchers of recreation, sport, and leisure have approached socialization in the structural functional perspective is to examine the factors that encourage participation across parts of the lifespan. This research focuses on why some individuals maintain LTPA participation from childhood and adolescence into adulthood, and why others withdraw from these activities at different transitional points in their lifespan. These studies have been informed by a wealth of theoretical frameworks, including Atchley’s (1989) continuity theory (Curtis et al., 1999), social learning theory (Csikszentmihalyi, 1997), life course/life span theory (Howell & McKenzie, 1987; Zick, Smith, Brown, Fan, & Kowaleski-Jones, 2007), and Iso-Ahola’s (1980) leisure repertoire model (Bocarro, Kanters, & Casper, 2006; Iso-Ahola, Jackson, & Dunn, 1994). This approach suggests that major socializing agents, such as schools, communities, parents, peers and teachers shape lifetime attitudes
towards participation (Vanreusel et al., 1997). Additionally, adults learn their role as a sport or recreation participant based upon their opportunities during childhood and adolescence. This framework suggests that as individuals age, they will seek to maintain some level of continuity in their lifestyle (Atchley, 1989). In order to encourage people to participate in recreational sport and physical activities throughout their lifespan, they must be provided with the opportunity to participate in a broad range of activities in childhood and adolescence that can be realistically maintained in adulthood (K. Green, Smith, & Roberts, 2005; Iso-Ahola, 1980).

Parallel to exploring the reasons adolescents participate in LTPA is the study of why they do not engage in sufficient amounts of physical activity. One well-used approach to this issue, from an intrapersonal perspective, is leisure constraints theory (E. L. Jackson, 2000). Constraints theory suggests that individuals perceive various intrapersonal, interpersonal, and structural barriers that inhibit or prohibit participation and enjoyment in leisure activities (Alexandris & Carroll, 1999; D. W. Crawford, Jackson, & Godbey, 1991; E. L. Jackson & Scott, 1999; Orsega-Smith, Payne, Mowen, Ching-Hua, & Godbey, 2007). Adolescents report a combination of intrapersonal and structural constraints to increased participation in LTPA (Thompson et al., 2005). The most often cited barrier to LTPA is a perceived lack of time (Kimm et al., 2006). It is expected that reduced opportunities for active transportation and a greater dependence on sedentary screen-based entertainment (e.g., television, internet use, and video games) has diminished leisure time available for physical activity (Godbey,
Additionally, adolescents report that the available physical activities that interest them are often limited (Kimm et al.).

Until recently, the constraints perspective was not a defined as theory per se (E. L. Jackson & Scott, 1999; M. S. Searle, 2000), but it has now developed into a more recognized theoretical framework (Henderson, Presley, & Bialeschki, 2004; Orsega-Smith et al., 2007). One strength of constraints theory is that it provides a bounded structure within which to examine leisure behavior from multiple perspectives. For example, many researchers have chosen to exclusively study structural constraints (Orsega-Smith et al.), such as institutional discrimination, cost, spatial distance, transportation, and governmental policies (Campagna et al., 2002; McMeeking & Purkayastha, 1995; D. Scott, 2000). Others have adopted a social interactionist approach to study interpersonal factors, examining the ways in which systems of social support restrict or encourage participation (Auster, 2008). Constraints theory also provides opportunities for researchers to develop interpretive approaches and the emergence of conceptual models that recognize how constraints work differently in different contexts and different levels, such as disability sport activities or outdoor recreation (J. L. Crawford & Stodolska, 2008; White, 2008).

Participation in LTPA has also been examined from parallel demographic and social stratification perspectives. The stratification framework argues that society is hierarchically arranged in a way that provides unequal access to resources for some individuals and groups at the expense of others based upon socially-constructed characteristics (Weber, 1957, 1978). According to Wearing (1998), the analysis of stratification in terms of lifestyle and cultural
patterns provides a better framework than strict Marxist class approaches for examining other socially constructed power relationships, such as race and gender. Because the purpose of stratification research in leisure studies is generally to understand variation in leisure styles, these approaches may also provide a more complex accommodation of these patterns than motivational activity-based studies (Kelly, 1999). This paradigm often bridges the traditional divide between agency and structure and provides a useful link between personal and environmental approaches to LTPA participation. The literature within this framework generally highlights three demographic variables: gender, race/ethnicity, and social class, and their effect on participation.

Researchers have found that, on average, adolescent girls engage in LTPA at lower levels than adolescent boys (Centers for Disease Control and Prevention, 2008a; Floyd, Spengler et al., 2008; Thompson et al., 2005) As indicated earlier, differences exist between the physical activity interests of boys and girls in adolescence. One reason for gender deficits in participation in LTPA is a reduced interest in sport among girls as they enter adolescence. Girls drop out of sport at higher rates than boys during the adolescent years (Young et al., 2007). In addition to requiring a high level of skill, competitive sports participation generally demands a greater commitment of time for practices and traveling to competitions. Kimm et al. (2006) discovered that lack of time was the primary reason girls in this age group dropped out of sport. Adolescent girls also seek out a broader range of competitive and non-competitive activities than are offered in traditional sports programs. Barr-Anderson et al. (2007) found that while basketball, soccer, and softball were popular
activities, sixth grade girls also reported high levels of participation in swimming, dance, cheerleading, and gymnastics. Traditional programs of competitive sports may also emphasize socially constructed masculine values such as violence and aggression (Hanson & Kraus, 1999). These characteristics may discourage interest in sport by girls who might view playing sport solely within the context of masculine values (Coakley, 2004).

The reasons for racial differences in participation in LTPA are complex (Philipp, 1998). Generally, two traditions developed from Washburne (1978) have emerged to explain racially stratified participation in recreation, sport, and physically active leisure. The ethnicity thesis parallels Bourdieu’s (2006) conceptualizations of *habitus*, group boundaries, and cultural meaning, suggesting cultural norms, values, and socialization patterns drive ethnic and racial differences in recreation and sport participation (Washburne, 1978). Following this argument, Philipp (1998) argues that race becomes central to peer group approval of leisure activities. The interpersonal influences of friends, family members, and other adult role models are critical for getting children to participate in sport and LTPA (Crossman, Sullivan, & Benin, 2006; Fein, Plotnikoff, Wild, & Spence, 2004). Children of racial and ethnic minority groups are therefore often encouraged to participate in activities that are culturally appropriate. Sport participation and LTPA is often considered suitable for males but not necessarily for females within the cultural traditions of many racial and ethnic minority populations. Therefore, cultural hypotheses may explain why racial and ethnic variations in physical activity participation are often found among girls, but not boys (Phillips & Young, 2008; Richmond et al., 2006; Trost et al., 1997).
In contrast, marginality suggests that racial differences in participation are a result of poverty, historic discrimination of minority groups, and neighborhood locations (Washburne, 1978). Because of their marginalized position in society, the opportunities for racial and ethnic minorities to participate in some activities are reduced (Gramann & Allison, 1999). For example, African Americans have historically been excluded from public spaces for swimming and therefore may be less likely to develop the skills necessary or the interest in participating in swimming activities (Hastings, Zahran, & Cable, 2006). Similarly, explanations of disparities in physical activity among racial and ethnic minorities are increasingly focusing on the relationship between race and social class. Specifically, within our society an individuals’ status as a racial or ethnic minority likely corresponds to lower socio-economic conditions. In 2004, the annual median household income in the U.S. was $30,124 for African Americans and $34,241 for Hispanics, compared to $48,977 for non-Hispanic whites. Similarly and perhaps more poignantly, nearly 1/4 of African Americans (24.7%) and Hispanics (21.9%) lived below the U.S. government established poverty line, compared to only 8.6% of non-Hispanic whites (U.S. Census Bureau: U.S. Department of Commerce, 2005, August). In the U.S., there is a clear relationship with being a racial or ethnic minority and the likelihood of being poor.

Participation in leisure activities, including LTPA, is directly tied to SES (Coakley, 2004; Lareau, 2002). Disproportionate conditions of poverty among racial and ethnic minorities compared to white Americans, lead to significant barriers (e.g., financial costs and spare time) that limit opportunities for LTPA (Day, 2006). It is also necessary to recognize
how low SES further limits opportunities for LTPA among racial and ethnic minorities through differences in service provisions available to these groups. Increased privatization and client-based management has reduced resources for community recreation, often excluding poor from these services (D. Scott, 2000). Social class is often treated as a confounding variable in the study of racial and ethnic differences in LTPA (Sallis, Zakarian, Hovell, & Hofstetter, 1996); however, SES may contribute considerably to the explanation of the relationship between race and obesity (Marshall et al., 2007). For example, Day found that individual poverty and level of education remained significant predictors of obesity after controlling for race and ethnicity. Similarly, Wen, Browning, and Cagney (2007) found that not only were neighborhood and individual SES significant predictors of levels of exercise in a Chicago sample, but that entering them into the model made individual and neighborhood measures of race and ethnicity no longer statistically significant.

Arguments of interpersonal, cultural, and structural reasons for racially stratified participation in LTPA, such as ethnicity and marginality, appear competitive. However, in practice they are often interrelated. Undoubtedly, the attitudes and cultural beliefs of members of minority groups towards leisure activities have been considerably influenced by historic patterns of racial discrimination (Philipp, 1999). Therefore, suggestions that these systems develop independent of structural determination are incomplete. Additionally, structural arguments like marginality have to acknowledge how racial ideology and culture have historically shaped socio-economic class divisions within our society. It is likely that SES can explain significant racial differences in participation in sport and other LTPA, and
there is compelling evidence that structural barriers to organized LTPA advantage white children (P. A. Goldsmith, 2003). However, race remains a salient issue in understanding how disparities in health and access to health-promoting resources exist in our society (Philipp, 1998).

In summary, childhood obesity is an alarming societal problem that can be prevented with increased LTPA to expend excessive caloric intake. Traditionally, researchers have used personal-level approaches focus on what individual variables influence participation in LTPA. These frameworks allow for the exploration of personal motivation, locus of control, self-determination, and reasoned action. They suggest that individuals are attracted to activities that match personal goal-orientation, competencies, and needs. At a micro-environmental level (King et al., 2002), personal-level approaches also explore how social influences, such as family members and peers, influence individual decisions to participate in LTPA. When focused at the individual level, constraints theory provides a framework in which to examine some reported reasons why adolescents do not participate in sufficient amounts of LTPA. Finally, demographics (e.g., age, gender, race, ethnicity, and social class), both individually and within social contexts seem to influence levels of individual participation in LTPA.

While personal traits remain strong predictors of participation in LTPA, physical and social environments are also an important determinant of levels of LTPA (Diez Roux, 2001; Giles-Corti & Donovan, 2002; Kaczynski & Henderson, 2007; Macintyre, 2007; Macintyre et al., 2008; Sallis et al., 2001; Young et al., 2007). A growing interest in the importance of
environments to facilitate or constrain health-related behaviors has emerged in the literature over the past few decades (Diez Roux). In the case of health behaviors that reduce the risk of obesity, the availability of proximal resources for LTPA, including facilities and programs, have been shown to be an important predictor of participation in physical activities (Estabrooks et al., 2003). In the current study, the availability of supportive environments for LTPA in middle schools will be examined. The next section will review how environmental conditions encourage or discourage LTPA participation.

**Environmental correlates of LTPA.** The influence of community and social environments on individual well-being has been a common theme in sociology since Durkheim’s (1966) analysis of suicide in the late 19th century (M. A. Lee & Ferraro, 2007). In recent years, research across multiple disciplines has emerged that examines how social and physical environments, analyzed at different levels (e.g., community, neighborhood, or school), influence LTPA (McNeill et al., 2006). While this research is nascent, a frequently-used trans-disciplinary foundation for examining the relationship of place and health is the social ecological paradigm (Stokols, Grzywacz, McMahan, & Phillips, 2003). Social ecological views of health and social behavior examine how individuals interact with their structural environments (Giles-Corti & Donovan, 2002; Kaczynski & Henderson, 2007; McLeroy, Bibeau, Steckler, & Glanz, 1988). Stokols, Allen, and Bellingham (1996), for example, argue that behavior is influenced by layers of social and environmental interactions that can either facilitate or constrain healthy living in individuals. This movement reflects an overall trend in the social sciences to move beyond individualistic perspectives to an
orientation that examines the influences of structural environments on individual behavior (Diez Roux; Macintyre, 2007; Macintyre et al., 2002). With respect to LTPA, personal-level explanations are only capable of partially explaining individual behavior (Henderson & Bialeschki, 2005). Increasingly, researchers have sought to identify the types of modifiable environmental features that encourage healthy lifestyles and how they are distributed across geographic space.

One goal of ecological approaches to physical activity and health is to broaden explanations of why individuals may or may not participate in LTPA beyond demographic, psychological, and social variables (L. M. Powell, Slater, Chaloupka, & Harper, 2006). Ecological frameworks examine environmental contexts that have the potential to change individual behavior (Sallis, Bauman, & Pratt, 1998). In the example of increasing LTPA, supportive environments for physical activity may reduce individual constraints and encourage participation while less supportive environments may prevent participation even when individuals are motivated to participate (Elder et al., 2007; O'Donnell, 2005; Thompson et al., 2005). Supportive environments make it easy for individuals to be physically active (Estabrooks et al., 2008; Stokols et al., 2003). Overall, creating or enhancing places and programs for physical activity can increase the number of people who participate in LTPA (Floyd, Spengler et al., 2008). Supportive environments increase opportunities for participation in LTPA by providing adequate and safe facilities, promoting a broad range of physical activities, and are inclusive to meet the needs and interests of many individuals (Young et al., 2007). Environmental factors operate on multiple levels ranging from social
influence of family and friends; to school, neighborhood and community factors; to the societal level (Estabrooks et al., 2008). Because of the complexity of ecological frameworks, and the multiple influences on behavior, researchers often focus on one environmental context (Rosenberger et al., 2005). For example, community-level environmental determinates of LTPA may include accessibility of facilities for physical activity (i.e., parks, gymnasiums, swimming pools), opportunities for activities (i.e., programs), aesthetics, mixed land-use design, and street connectivity to encourage active transportation (Wen et al., 2007).

Empirical studies have found a positive relationship between physical activity and neighborhood safety and access to recreational facilities (Utter et al., 2006). Additionally, it has been demonstrated that interventions that improved the design, quality, and appearance of playgrounds increased children’s LTPA (Ridgers, Stratton, Fairclough, & Twisk, 2007). Finally, supportive social relationships, such as family, friends, and non-relative adults can encourage participation in LTPA (McNeill et al., 2006).

*Place disparities in access to LTPA environments.* Empirical evidence has shown that populations with increased access to supportive environments for LTPA are more physically active than populations with fewer supportive environments (Rosenberger et al., 2005). A lack of supportive environments or opportunities to be physically active encourages sedentary behaviors (Lobstein et al., 2004). Increasingly, ecological approaches have increased our understanding that environmental resources for LTPA are not distributed equitably in our society. Lobao (2004) defines spatial inequality as “place stratification or inequality within and between territorial units” (p. 1). She suggests that economic benefits,
health status, education, and other markers of societal well-being often vary inequitably across geographic space. “Spatializing” inequality by calling attention to how certain geographic locations are deprived of certain benefits found in other locations, Lobao argues that social scientists can help move public policy conversations beyond the current “ideologies of individual blame for social misfortune” (p. 4). Indeed, many authors have argued that socially disadvantaged populations are more likely to live in geographic areas that contain fewer environmental resources that encourage healthy nutrition and LTPA (Smoyer-Tomic et al., 2004).

Contextual factors at the family, school, neighborhood, community, and state level can influence disparate outcomes in children (Singh et al., 2008). Through these social institutions and relationships, social inequality is often reproduced through hegemonic political systems and cultural practices that benefit dominant groups (Bourdieu, 2006). One position from which to examine the inequitable distribution of resources for LTPA is the environmental justice perspective. Environmental justice started in the United States as a grassroots movement within communities in protest of inequitable government policies related to land use and environmental hazards (W. C. Taylor et al., 2006). Geographic and social equity, as well as meaningful involvement of all citizens in the development of policies related to community environments are its central tenets. Though initially environmental justice was primarily concerned with the placement of hazardous waste facilities in and near poor minority communities, its scope has expanded to include inequities related to many different built, natural, and social environments that affect the health of
individuals (W. C. Taylor et al.). For example, Rosenberger et al. (2005) found that West Virginia counties that were the most physically active were associated with higher quantities of environmental supports for recreational physical activity. However, in a national study, the availability of these types of recreational facilities was associated with community SES and racial and ethnic composition (L. M. Powell et al., 2006). An environmental justice perspective would advocate for the equitable distribution, support, and accessibility of public amenities for healthy lifestyles (e.g., recreation facilities and programs) across all social groups (Smoyer-Tomic et al., 2004).

Areas with higher concentrations of low-income and minority populations may have less access to supportive environments for LTPA (Giles-Corti & Donovan, 2002; Macintyre et al., 2002; Smoyer-Tomic et al., 2004; W. C. Taylor et al., 2006). Arguing from an environmental justice perspective, some have argued that children’s health deficits, partially caused by inequitable spatial distribution of resources, likely impairs adult health and well-being and therefore reproduces health inequality (Blacksher, 2008; Pickett & Pearl, 2001). The spatial inequality in supportive health environments may partially be related to the power relationships and the distributional political process of community resources. For example, Floyd and Johnson (2002) suggest that when public policy related to the allocation of community recreational resources is driven by special interests there may be negative distributional consequences for large segments of the population. The environmental justice perspective implies that all members of the community should be provided access to information and a voice in the decision-making process for allocating these resources. One
positive characteristic of the environmental justice approach is that it provides researchers with action-based outcomes, with particular importance placed upon initiating social change within and across communities.

Two of the most important environments that influence health behaviors for children are neighborhoods and schools. A large body of research has emerged documenting the influence of place on the life chances of individuals (Charles, 2003). It has been suggested that living in one area rather than another can contribute the life chances of children (Atkinson & Kintrea, 2001). Life chances, in this sense, refers to access to opportunities for improved quality of life (Breen, 2005; Weber, 1978) The relationship between place and inequality is often considered compositional, that is disparities are the result of the combined individual characteristics of people who are concentrated within a geographic area (Charles). However, a growing interest has developed in identifying the contextual effects of living in an area that, outside of individual characteristics, increase disparities in social conditions, health, and well-being of its residents (Diez Roux, 2001; Macintyre et al., 2002).

The characteristics of neighborhoods in the United States are an oft-cited example of the context of place in shaping inequality. Most Americans live in neighborhoods segregated by race and social class, and this segregation has implications for life chances. For example, residents of predominantly lower social class and minority neighborhoods experience fewer educational opportunities, less access to good jobs, increased crime, and less developed social networks than residents of White or middle class neighborhoods (Charles, 2003;
One particular aspect of disadvantaged neighborhoods is the lack of community resources that contribute to the well-being of children’s lives. The most significant area of children’s lives affected by neighborhood deficiencies is their health (Wen et al., 2007). Neighborhoods deprived of social and economic resources tend to be deficient in health-promoting resources. In their analysis of research on neighborhood effects on health, Pickett and Pearl (2001) found that neighborhood residence had a significant influence on individual health in over 90% of the published studies they reviewed. Neighborhood socio-economic status is believed to influence health disparities independent of individual socio-economic status (Wen et al.). Individuals in poorer neighborhoods often have reduced access to health-promoting facilities and programming, lower quality health care provisions, higher crime, and fewer healthy food options (Glover, 2007; Macintyre et al., 2002; Wen et al.).

Children who live in the same neighborhood have similar life chances, and those life chances are likely to be different from children who live in other neighborhoods with different racial or social class compositions. One social institution that magnifies the place effect on inequality is the educational system. With the current U.S. system that prioritizes local funding and control of education, the quality of school that a child attends is directly related to their economic background. While other developed nations have allocated school resources more universally, the U.S. employs a client-based approach that assures better schools for socially and economically advantaged children (Condron & Roscigno, 2003;
Kerckhoff, 2001; Lucas, 2001). Condron and Roscigno point out that understanding how resources are spent within school districts is vitally important to explaining educational disparities. They argue that school districts allocate fewer financial resources to schools with higher concentrations of poor and minority students. Inequitable patterns of within-district funding of schools based on race and class could be influenced by conscious discriminatory decisions by local leaders, the influential relationships between higher-SES parents and local leaders, or the ability of higher-SES schools to be better organized to request increased funding (Condron & Roscigno). Regardless of the sources of resource disparities, Shapiro (2004) notes that “no matter how school quality is measured, whether by class size, teacher credentials, teacher salaries, computers, or curriculum” minority children attend lower-quality schools in comparison to white children (p. 144).

In summary, new approaches to the study of LTPA promotion as a strategy for reducing levels of childhood obesity suggest that environmental factors may influence physical activity levels among children and adolescents. Ecological approaches seek to identify the modifiable environments that either facilitate or constrain individual participation in LTPA. In this process, researchers have suggested that environmental supports for LTPA may encourage participation beyond individual motivation. Some of the environmental contexts researchers have identified that influence LTPA are accessible facilities, inclusive and broad programs, transportation, and social support. Environmental supports for LTPA are not expected to be distributed equitably, with areas comprised of higher-SES and lower-minority populations to likely have increased access to supportive environments for LTPA.
In this study, North Carolina public middle schools’ environmental supports for LTPA will be assessed. Using Macintyre’s (2000) model of deprivation amplification how environmental support for LTPA is geographically distributed across the state and the relationship between compositional, contextual, and collective characteristics of schools and communities in determining supportive environments will be explored. In the next section, the theoretical framework of deprivation amplification is described.

Deprivation Amplification

Though research on spatial inequality related to supportive environments for LTPA is in its infancy (J. Pearce, Witten, Hiscock, & Blakely, 2008), scholars have attempted to expand on the empirical and theoretical knowledge of placed-based health disparities. Macintyre (2000) proposes a model of deprivation amplification as a conceptual framework to examine health disparities across geographic space. Macintyre et al. (2008) define deprivation amplification as a “pattern by which a range of resources and facilities which might promote health are less common in poorer areas.” (p. 901). As a theoretical model, deprivation amplification suggests that the quantity and quality of accessible public resources that promote healthy lifestyles are lower within areas populated by socially and economically disadvantaged groups compared to more advantaged areas (Macintyre, 2000, 2007; Macintyre et al., 2008). The effect of having fewer accessible resources to support healthy behaviors influences health conditions beyond the personal-level (Gordon et al., 2003). Macintyre argues that this process serves to amplify the individual constraints to active living faced by the residents of these areas. Conversely, one might argue, that this process may
provide resources that offer some protective advantage to individuals from socially or economically disadvantaged groups who live in or within close proximity to more affluent areas (Estabrooks et al., 2003). More socially deprived areas often have fewer parks and green spaces, fewer sports fields and recreation centers, lower quality playgrounds for children, and more perceived threats to personal safety (Estabrooks et al., Taylor et al., 2006). Additionally, these areas may have fewer organizations and programs to structure physical activities in the facilities to which they do have access. Because health inequalities are often determined by the health-promoting resources to which individuals have access, the assumption is that the inequitable distribution of these resources contributes to lower quality health in deprived areas (Bernard et al., 2007).

Deprivation amplification is an extension of Tudor Hart’s (1971) inverse care law which states “that the availability of good medical care tends to vary inversely with the need of the population served” (p. 412). Deprivation amplification also closely parallels the conceptualization of environmental justice (Macintyre et al., 2008). Inverse care and environmental justice are most often applied to different contexts. Inverse care is generally conceptualized in terms of the provision of health care and medical services and environmental justice is most often used to describe conditions of heightened health risk due to the presence of hazards to the natural environment. However, Macintyre (Macintyre, 2000; Macintyre et al., 2002; Macintyre et al., 2008) argues that deprivation amplification develops as an extension of these concepts when conditions exist in proximal environments
for one group of individuals that either fail to promote healthy lifestyles or encourage unhealthy lifestyles.

Components of deprivation amplification. Macintyre et al. (2002) suggest three explanatory components to how the process of spatial inequality of health through deprivation amplification works across communities: compositional, contextual, and collective. Compositional explanations are developed through the characteristics and traits of the individuals who are concentrated within a geographic area. Contextual explanations refer to the structural opportunities available within the local built, natural, and social environments. Finally, collective explanations are comprised of the socio-cultural characteristics, historical elements, shared norms, traditions, and values found within an area. While compositional explanations are often cited as a stronger predictor of health disparities, health inequality across many geographic locations is often a result of contextual effects beyond individual-level traits.

The limited research in this area has been descriptive in nature, documenting whether or not these place disparities exist (Diez Roux, 2001; Ellaway et al., 2007; Estabrooks et al., 2003; Hillsdon et al., 2007; Macintyre et al., 2002). The research examining spatial inequality in the context of LTPA focuses exclusively on the relationship between compositional factors (i.e., racial composition and SES) and contextual factors, often operationalized as the quantity of facilities located nearby. For example, in national samples Gordon-Larsen, Nelson, Page, and Popkin (2006), Powell et al. (2006), and Estabrooks et al. demonstrated an association between high-SES and low minority areas with a higher quantity
of public facilities for LTPA. Crompton and West (2008) suggest that the reasons behind inequitable provisions of resources for leisure services have been largely ignored in the literature. Similarly, there have been no studies that have examined in more detail why these disparities may exist. What is it about geographic areas populated with socially disadvantaged individuals that inhibit the provision of supportive environments for health behaviors? Specifically, Bernard et al. (2007) suggest more detail is needed about the interrelatedness among compositional factors, community context, and collective social functioning in creating environments that support health behaviors. They argue that residents, individually and collectively, shape structure and therefore community context may be a manifestation of community composition. For example, fewer resources may be available for physical activity in lower-SES areas because of a lack of interest (Cohen et al., 2007). Macintyre et al. (2008) also indicate that the concept of deprivation amplification should be expanded in new ways to examine the relationship between people and place.

Ecological attributes of geographically-defined (i.e., contextual place effects) are also expected to exist beyond those explained by community composition. Contextual factors refer to the physical environment, material infrastructure, and services provided to the local population (Macintyre et al., 2002). The ability to provide specific environments for health promotion, such as LTPA, is directly related to the availability of community-level resources (Abercrombie et al., 2008). In this case, the provision of supportive environments for LTPA and services are expected to be largely influenced by distributable economic and human resources (Bernard et al., 2007; Morton, 2003). The level of resources available to a
Community is often shaped both by the composition of the population as well as the physical features of the natural environment (e.g., climate or natural resources). The principle determinant of accessible resources for LTPA is likely the availability of funding (Cohen et al., 2007; Lounsbery et al., 2007). Wechsler et al. (2000) suggest that a lower tax base and fewer capital resources in poorer areas may restrict their abilities to provide supportive environments for adolescent LTPA. Similarly, due to financial constraints (Lounsbery et al.), the availability of sufficient human resources needed to implement programs is likely to be lower in socially and economically deprived areas (Wechsler et al.).

Community contextual factors are also significantly shaped by collective social functions. While the absolute level of available resources for community allocation is important to provide infrastructure, how these resources are prioritized and distributed may explain variation in environments between and within communities (Abercrombie et al., 2008; Crompton & West, 2008; McNeill et al., 2006). Collective aspects of community structures are expected to influence a population’s capability to support common goals and collective action (i.e., social capital or social cohesion) (Coleman, 1988; Putnam, 2000; Sampson, 2001; Wilkinson, 1991). This perspective derives part of its theoretical foundation from Tönnies’ (1957) conception of Gmeinschaft and Gsellschaft, literally translated as community and society, suggesting the existence of competing principles of individual self-interest and concern for the greater good of shared community interests. Additionally, consideration of the role community social cohesion plays in individual outcomes dates back to Durkheim (Hulse & Stone, 2007).
Putnam’s (2000) perspective of social capital has dominated research in the U.S. He argued that when communities exhibit attitudes of trust and reciprocity, they develop a collective capacity to work together to pursue communal objectives (Andrews, 2009). Wilkinson (1991) contends that a process of social interaction among people living in a shared geographic environment is the foundation for collective action and culture. It is argued that through patterns of social norms and networks that facilitate feelings of trust, social capital develops and individual interests become more aligned with collective interests which in turn leads to increased collective action (Lin, 1999; Woolcock, 2001). However, this view fails to account for power relationships and social structures that often relate to the construction of meanings associated with social interactions (Coakley, 2004). Additionally, social capital has more to do with underlying social and economic conditions than social networks that can be identified as a product of individuals’ leisure habits (Alexander).

A competing view on social capital has been proposed, primarily from a European perspective. Putnam’s (1995, 2000) premise is that social capital develops from the ‘bottom up’ through voluntary contact through social networks. His primary assumption is that contact over time will lead to increased social capital. Conversely, the European perspective uses Bourdieu’s (2006) connection of social capital to symbolic power. The development of social capital occurs primarily in close connections within socially similar groups, what Putnam describes as bonding social capital. This social capital develops quicker within groups who share identity, values, and behaviors (Hulse & Stone, 2007). Social capital is not necessarily inclusive. Social capital is deployed to provide members of the in-group access
to power and resources at the expense of other less connected groups. Bridging social capital that supposedly develops across social groups rarely occurs (Flora & Flora, 2003). Social capital, according to Bourdieu, provides some groups with access to economic resources while excluding others through the transmission of power. Hero (2003b), for example challenges the notion that an unequal society can naturally build bridging social capital. This perspective suggests that only through ‘top down’ policies to reduce inequality can community social capital develop.

It has been suggested that the best way to approach understanding how social capital emerges and functions in communities is to combine both of these perspectives (Narayan, 1999; Woolcock, 1998). Within this perspective, social capital both reinforces and reduces inequality in communities. As suggested by Putnam (1995), community-level, or bridging, social capital can lead to collective action, but economic and social conditions often undermine its development. Two key antecedent conditions likely to significantly reduce levels of social cohesion across communities are racial heterogeneity and income inequality.

Racially diverse communities tend to have lower levels of social capital compared to more racially homogenous communities (Costa & Kahn, 2003; Hallberg & Lund, 2005; Putnam, 2007). Putnam suggested that racial differences directly contribute to at least a short-term erosion of social capital. Especially in U.S. studies, researchers have identified a strong and negative association between racial and ethnic heterogeneity and social capital or social cohesion (Alesina, Baqir, & Easterly, 1999; Hero, 1998, 2003a, 2003b; Letki, 2008; Putnam; Sampson & Groves, 1989; Sampson, Radenbush, & Earls, 1997). In general,
individuals living in racially heterogeneous areas are less connected socially, less likely to be involved in community activities, have lower expectations of local government and leaders, and are less likely to engage in collective action (Alesina & La Ferrara, 2000; Putnam; Rupasingha, Goetz, & Freshwater, 2006). This position has been somewhat controversial in practice, leading many neo-conservative policy makers to draw upon this research when advocating for anti-immigration laws or calling for the abandonment of multiculturalism (Cheong, Edwards, Goulbourne, & Solomos, 2005; Coffé & Geys, 2006). However, it is important to recognize the nuanced nature of this relationship and how diversity in and of itself is not necessarily the primary contributing factor to lower levels of social cohesion.

One theory of how racial diversity contributes to lower social capital is that attitudes of cooperation and trust that leads to in-group, or bonding, social capital develops much quicker among individuals who share racial or ethnic characteristics. Because individuals have a “natural aversion to heterogeneity,” in-group biases form that preference relationships within racial or ethnic groups (Alesina & La Ferrara, 2002, p. 225). Proponents of this premise speculate that a process of self-selection favors in-group interactions primarily because of unfamiliarity with members of different groups (Rupasingha et al.). From this perspective, many scholars have made a connection to contact theory suggesting that racially different groups are only initially hesitant to trust each other and cooperate. As they become more familiar, racial prejudice breaks down and barriers to social capital erode (Marschall & Stolle, 2004; Oliver & Wong, 2003; Putnam, 2007). Following from the viewpoint of Putnam (1995), through frequent contact, social networks and social capital are developed
from the ‘bottom up’. However, this contact has to be under the right circumstances. Specifically, contact between racial or ethnic groups has to be positive and under the assumption of some level of equal social standing across racial and ethnic groups (Marschall & Stolle, 2004; Putnam, 2007; Stein, Post, & Rinden, 2000). For example, racially heterogeneous communities with low poverty and a highly-educated population have been more likely to develop social capital in this way (Marschall & Stolle). Unfortunately, in the U.S., racial heterogeneity has developed within the context of power relationships tied to race and ethnicity that often inhibit the emergence of high levels of social capital.

Within the U.S., racial diversity generally does not occur under terms of equal social interactions. Racially heterogeneous communities often contain a historically-privileged White majority population with large concentrations of racial and ethnic minorities (Forbes, 1997). Building from Blalock’s (1967) threat hypothesis and conflict theory, the presence of a high concentration of racial and ethnic minorities may illicit higher levels of prejudice among members of the majority (Alesina & La Ferrara, 2002). Glaser (1994) and Taylor (1998) both found that racial hostility among White respondents increased along with increases in racial diversity, particularly in Southern U.S. samples. According to Putnam (1995), this context is important to understanding the role of racial heterogeneity in reducing social capital. In the South, racial diversity existed primarily through a legacy of slavery and Jim Crow laws that maintained power exclusively in the hands of White citizens. After the Civil Rights Era expunged de jure racism in communities with large African American populations, Whites experienced a significant threat to their political power. Rather than
cooperation, what often developed from this situation was a contentious relationship along racial lines over limited public resources (Putnam, 2007). This process has emerged similarly with the more recent arrival of a large Latino immigrant population in the South (Saenz & Torres, 2003).

Overall, ethnically diverse areas suffer from a lower investment in public goods (Alesina et al., 1999). Wilson (1996) argued that public services are often viewed by Whites as exclusively benefiting members of minority populations. Because Whites may see themselves as less likely to benefit from public goods and more likely to use private goods, they may favor policies that reduce taxes and subsequently support for public services. For example, the widespread founding of church-sponsored private schools in the South that draw predominantly White students significantly reduced support for public education in many areas that continues today (Clotfelter, 1976). Additionally, other communities with a White majority, but a large African American population have passed property tax caps and other measures that ensure fewer available resources for public services (Alesina et al., 1999). The other essential characteristic of racial and ethnic diversity in the U.S. is the often inseparable link between racial diversity and income inequality (Sampson & Groves, 1989; Sampson et al., 1997). Because of the large correlation between race and income, exploring the relationship between racial heterogeneity and social capital must also consider the role income inequality plays in reducing social cohesion.

Income inequality is a significant hindrance to the development of community-wide social capital. Rupasingha et al. (2006) argued that “When society’s rewards become more
unevenly distributed, people may feel exploited by others, thus diminishing their faith in fellow citizens” (p. 91). When lower income community residents perceive conditions of economic inequality, interests become more polarized and community cohesion is less likely to occur (Fehr & Schmidt, 1999; Letki, 2008). Individual concern for meeting basic needs among low income residents may prevent their active participation in community projects. Additionally, social networks rarely develop between people with large differences in income, particularly when economic capital is used as a means of symbolic power (Alexander, 2007). In a New Zealand study, Stephens (2008) explored how this process may create significant problems in rural areas. She indicated that higher income residents of rural areas identified the closest urbanized area, rather than their local town, as their social and service center. These residents possessed a greater ability to travel regularly to cities and could afford higher-priced services provided in these areas. Higher income individuals were also more likely to enroll their children in private schools. The result of these patterns was that higher income residents were not concerned about any lack of public services in their immediate area since they perceived no direct benefit to themselves. They were therefore more likely to fight attempts by local councils to increase taxes to improve public goods.

The polarizing effect of income inequality in communities is often considered to be an independent factor to reducing social cohesion (Letki, 2008). However, it is difficult to separate the influence of income and racial inequality in practice, and they should be studied together (Knack & Keefer, 1997; Sampson & Groves, 1989). For example, Boix and Posner (1998) found that income inequality often encourages competition over public goods,
however Oliver and Mendelberg (2003) argued that in these communities group allegiances more often along racial rather than economic lines. That is, low income Whites may be more likely to align with middle and upper class Whites in support of policies that have negative economic consequences for themselves, rather than partnering with low income African Americans. Regardless of how racial and economic composition specifically influence the development of social capital, only when individuals view each other as social and political equals are they likely to feel an obligation to promote communal goods (Rice & Feldman, 1997).

A final key factor that influences levels of social capital in communities is the level of education across the population. It is well-documented in the literature that a highly educated population, regardless of other population demographics, leads to higher levels of social capital and collective action (Glaeser, Laibson, & Sacerdote, 2002; Helliwell & Putnam, 1999; Putnam, 1995). In fact, education may be the strongest predictor of community-level social capital in the U.S. (Alexander, 2007; Rupasingha et al., 2006). Level of education is often perceived to be an important determinant of individuals’ attitudes, beliefs, and behaviors. It is expected that higher levels of education across a population brings with it increased levels of civic engagement and involvement in community-wide objectives (Putnam; Rupasingha et al.). Finally, a more highly educated population may be more supportive of public provisions of goods and services.

Communities that are more socially unequal and heterogeneous are less likely to create social capital or social cohesion that encourages collective action. Individuals in these
communities may be less likely to be concerned with or support larger community issues or become involved in community programs (Alesina & La Ferrara, 2002; Coffé & Geys, 2006; Putnam, 2007; Rupasingha et al., 2006; Wilkinson, 1991). Homogenous communities, even those with high concentrations of poverty, may provide opportunities for citizens to collectively overcome some levels of community deprivation through collective action. In heterogeneous communities, however, groups often differ in their access to social networks and power relations and therefore have differing levels of influences in the process of allocating community resources (Alesina et al., 1999; Oliver & Mendelberg, 2000; Utter et al., 2006). In communities that are low in social capital or social cohesion, adversarial relations may emerge over resources with disadvantaged groups perceiving less access to public institutions (Portes & Stepick, 1993; Stephens, 2008; Stolle, 2003). Conversely, when individuals within a community are willing to cooperate with each other to overcome collective problems, social capital can be a mechanism by which citizen self-interest can be reduced for the communal good (Boix & Posner, 1998; Marschall & Stolle, 2004; Putnam, 2000). For example, rural areas which are high in social capital, residents may work together to counteract low levels of services by lobbying for increased federal government funding or providing volunteer labor (Stephens). Therefore, communities with large racial and ethnic divisions or high levels of economic inequality may exhibit fewer public goods and services, such as environmental support for LTPA.

The concept of deprivation amplification continues to be modified and expanded (Macintyre et al., 2008); however, its fundamental tenet is that the quantity and quality of
accessible public resources that promote healthy lifestyles are lower within areas populated by socially and economically disadvantaged groups. Part of the existence of place disparities in resources for LTPA may be explained by the composition of the population living within a locality. That is, the aggregated individual interests and priorities of residents of similar demographics living in disadvantaged areas are such that demand for those provisions are low (Bernard et al., 2007; Cohen et al., 2007). Alternatively or additionally, community and local resources in disadvantaged areas are limited and therefore unavailable to provide adequate community services. Finally, areas with high levels of social and economic disadvantage are often marked with low levels of social capital and therefore are less likely to engage in collective action and community development that leads to grassroots support for community programs and the equitable allocation of resources. Figure 2 below illustrates the potential relationship of individual components of deprivation amplification that influence levels of environmental support for LTPA.
Figure 2. Conceptual model of how compositional factors, contextual resources, and social functioning influence environmental support for LTPA based on framework of deprivation amplification.

Critiques of deprivation amplification. Few studies have examined place disparities in the provision of supportive environments for LTPA and fewer have used deprivation amplification as a conceptual model (J. Pearce et al., 2008). One of the issues of deprivation amplification is that it has been inconsistently supported by empirical research. For example, Macintyre (2007) critiqued her own work, suggesting that “we need to look carefully at some of our assumptions, including those which suggest that such environmental disincentives are
commonly present and might be able to explain poorer nutritional and physical activity behaviors in more disadvantaged areas” (p. 5). In some studies (e.g., see Giles-Corti & Donovan, 2002; Pearce, Witten, Hiscock, & Blakely, 2007; Smoyer-Tomic et al., 2004), authors have found that more deprived geographic areas may have greater access to public recreation facilities and healthy food outlets than affluent areas. Two arguments for these findings are that zoning laws in more affluent neighborhoods may prohibit mixed-use planning and larger concentrations of lower SES residents in city centers may increase the proximal location of facilities in relationship to disadvantaged areas (Macintyre et al., 2008). One study in the United Kingdom also found that even though lower income children had fewer available facilities for LTPA, they were no less physically active than more affluent children due to active transportation and other factors (Voss et al., 2008).

However, Cummins (2007) suggests that results which may be counter-intuitive do not necessarily discredit the underlying theory of deprivation amplification. First, the relationship between place and health is extremely complex, and considering the broader socio-economic and cultural variations that exist, this relationship may vary across societies (Giles-Corti & Donovan, 2002; Macintyre, 2007; Macintyre et al., 2002). For example, as opposed to Europe and Oceania, the results of studies in the U.S. have supported the concept of deprivation amplification more consistently (Cummins, Curtis, Diez-Roux, & Macintyre, 2007; Macintyre et al., 2008). Because its residents may be more vulnerable to contextual and structural determinants of health, deprivation amplification may be more observable within the U.S. than other developed nations (Cummins & Macintyre, 2006). Few developed
nations have experienced the same traditions of social and economic segregation as the U.S. (Crowder & South, 2005), so it may come as little surprise that this country best demonstrates characteristics of spatial health inequalities. Thus, the use of deprivation amplification in studies focused on geographic areas within the U.S. remains a valid conceptual tool.

Secondly, many researchers who have challenged the validity of deprivation amplification often fall into what Cummins (2007) has called the “local trap” (p. 355). That is, they have tended to become overly-focused on comparing neighborhoods as the unit of interest within communities. For example, one study in Australia that suggested disadvantaged areas had more access to LTPA environments than more affluent areas was limited to one comparatively wealthy city (Hillsdon et al., 2007). Therefore, even disadvantaged areas in this study were relatively well-off. Additionally, in these studies, researchers have tended to focus on large cities (Macintyre et al., 2008). Pearce et al. (2008) found that rural areas may be more vulnerable than urban areas for deprivation amplification. Lobao (2004) advocates a “regional approach to spatial inequality” to compare stratification across geographic space (p. 2). She suggests that often spatial inequality becomes conceptualized at two extremes, either comparing national or intra-city inequality, and significant questions can be addresses by comparing communities, counties, or states within regions. Though deprivation amplification has rarely been applied in a regional approach to spatial inequality (Hillsdon et al., 2007), it may be an effective model considering how
supportive environments are expected to vary significantly across communities (Abercrombie et al., 2008).

Finally, though it has been shown that facilities and areas for physical activity are predictors of actual LTPA (Estabrooks et al., 2003), measuring simply the presence of these environments within a geographic area fails to account for the quality of available resources. Additionally, deprivation amplification and similar frameworks have conceptualized access as proximal distance, often using geographic information systems (GIS) technology to measure linear distance. Through this process, researchers fail to account for general patterns of individual mobility external to the neighborhood unit and how people access resources across communities. They also fail to consider the financial barriers to accessibility and the “social, cultural, and gender-based constraints as well” (Smoyer-Tomic et al., 2004, p. 288). Equitable access implies that individuals of all types of social backgrounds have opportunities to use and participate in public programs and facilities. Studies that found a higher number of available resources in socially and economically deprived areas discovered different results when they accounted for the quality of these facilities (Smoyer-Tomic et al.).

Deprivation amplification may be more prominent in rural populations (J. Pearce et al., 2008) and in settings where individuals are place-bound (Bernard et al., 2007). Considering most school districts maintain attendance policies based on residence, schools may provide a unique application for this framework. In the current study, the application of deprivation amplification is extended to compare school environments in rural and non-rural
communities. In the next section, differences between rural and non-rural settings as they apply to deprivation amplification and the provision of supportive environments for LTPA will be discussed.

Rural and Urban Differences

While the U.S. is now predominantly urban, rurality remains an important concept in our society (Brown & Swanson, 2003; Miller & Bates, 1987). By the 2000 census, over 80% of the U.S. population lived in cities, however 56 million Americans still resided in rural areas and rural communities; a number that exceeded the population of all but 22 nations (Brown & Swanson). In 2006, 1/5 of all U.S. students attending public schools did so in rural areas. For many Americans, idealized visualizations of rural life represent a simpler way of life, traditional values, strong family ties, and connections with natural resources (Brown & Swanson). Despite the romanticized bucolic imagery of rural life, gaps in economics, health, and other quality-of-life measures exist between rural and urban areas (Brown & Swanson). Children and adolescents who live in some rural areas of the U.S. may be especially at-risk for overweight and obesity (Harrell et al., 2005; M. C. Nelson et al., 2006). However, despite the gaps in health outcomes between rural and non-rural areas, rural populations and communities have been considerably understudied in research related to health and physical activity (M. C. Nelson et al.). The three factors associated with deprivation amplification (compositional, contextual, and collective) provide some insight into why individuals in rural areas are less likely to participate in LTPA and are more likely to be at-risk for overweight and obesity.
Defining rural. Though differences between rural and urban populations remain a widely-used concept in different academic disciplines, there is very little agreement over the definition of ‘rural’ (Brown & Swanson, 2003; Miller & Bates, 1987). The consensus among many Americans is that “[we can] tell a place is rural when we see it” (Wimberley, 1997, ¶ 1), but it becomes more difficult to operationalize the concept of rural in empirical research. Defining rural (or the categorization of any geographic place) recognizes that social fields develop as individuals meet their physical, mental, and emotional needs through systems of social relations. Wilkinson (1991) contends that this process of social interaction among people living in a shared geographic environment is the foundation for collective culture and identity for localities. Despite evidence that social life has become more globalized and fragmented, the participation of individuals in networks of interaction within localized space sustains the relevance of community in contemporary society (Luloff & Bridger, 2003). For residents of rural areas, these interactions may be different from those living in urban areas (Wimberley, 1997).

Rurality is associated with low population size and density and contrasted to urban settings (i.e., cities) with high population size and density. Brown and Swanson (2003) suggest that these measures remain valid determinants of rural and non-rural comparisons. Rural and urban, however, are not dichotomous nor are there discrete differences between them (Brown & Swanson, 2003). With increased communications technology and improved transportation, patterns of interaction between rural and urban places often overlap (Willits, Bealer, & Crider, 1982). However, variation does exist between places with different
population densities, economic bases, and degrees of social isolation from other areas (Tickamyer, 2000). Therefore, the use of rural and non-rural ideal types is needed to compare places.

Terminology that frames place comparisons based on rural and urban classifications are still widely accepted in research. Traditional urban/rural dichotomies remain popular despite evidence that they do not realistically capture the relative degrees along what is in reality a rural-urban continuum (Brown & Swanson, 2003; Willits et al., 1982). Rural and non-rural categorizations are most often taken from government designations reported by the U.S. Census Bureau and the Office of Management and Budget (OMB). Since the 1940s, county-level units have been designated as metro or non-metro based on population centers (Isserman, 2005). Metro areas include counties with one or more cities of at least 50,000 residents or a total population of 100,000. Adjacent counties are included in the area if they have high population density or are connected to the central county through commuting patterns (U. S. Department of Agriculture, 2004). Rural is simply defined as those counties not classified as metro. In 2003, the OMB further delineated the census categories by adding a ‘micropolitan’ classification to counties with urban centers between 10,000 and 49,999 (U.S. Bureau of the Census, 2006).

Although there is no satisfactory way to differentiate rural and urban areas (Isserman, 2005), there are two significant problems with directly using the Census Bureau/OMB classifications. First, the use of county-level data fails to recognize that large parts of counties classified as ‘metro’ may actually be rural (H. F. Goldsmith, Stiles, & Puskin,
Second, using these classifications assumes that metro and non-metro populations are broad and homogenous and does not capture variance within different types of rural and urban areas (Brown & Swanson, 2003; Isserman, 2005). Willits, Bealer, and Crider (1982) argue that “rural persons and communities are not all alike. They do not present a single, united, or differentiated position on any characteristic.” (p. 74). For example, there is a distinct difference between rural areas on the fringe of metropolitan areas that have experienced recent rapid growth and development and those that are more remote (LeSage & Charles, 2008).

Isserman (2005) suggests that practical limitations require researchers to start with the county-level data provided by government statistics, but suggests a progression towards a more continuous categorization of places to better capture variation within and between types of locations. Three government agencies, the Department of Agriculture (USDA), Office of Rural Health Policy (ORHP), and Department of Education, National Center for Educational Statistics (NCES) have attempted to further delineate classifications of rural and urban in the U.S. to administer programs. The USDA introduced a nine-category rural-urban continuum system that classifies counties from 1 (metro counties with 1 million or more population) to 9 (non-metro counties with less than 2,500 population, not adjacent to a metro county). Although the USDA system allows for a better partitioning of metro and non-metro areas, it still uses entire counties as its units of measurement. Recognizing the problem with county-level designations, the ORHP uses the Goldsmith modification (H. F. Goldsmith et al., 1992) to further designate census tracts that are substantially rural, but are located within metro
counties, to be designated as rural. This system permits an alternative to designating entire counties; however, it maintains a dichotomous categorization of rural and non-rural.

Developed in 2006, the NCES system (Provasnik et al., 2007) is more consistent with recommendations to further delineate different types of rural, suburban, and urban locations on a smaller-unit scale. NCES uses geographic information system technology, combined with OMD and Census Bureau data to classify school communities, based on latitude and longitude coordinates, in relationship to commuting distance to urban centers. The NCES classification system categorizes locations in 4 main classifications (city, suburban, town, and rural) and 12 sub-classifications (3 within each main classification). This process does not rely on county boundaries and allows for a differentiation between remote rural areas and those located nearer to urban areas (Provasnik et al.). Overall, the NCES system provides a useful conceptualization of the rural-urban continuum, especially when studying school environments. The NCES classification system is shown in Table 2.
### National Center for Educational Statistics Locale Categories

<table>
<thead>
<tr>
<th>Locale</th>
<th>Definition</th>
</tr>
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<tbody>
<tr>
<td><strong>City</strong></td>
<td></td>
</tr>
<tr>
<td>Large</td>
<td>Territory inside an urbanized area and inside a principal city with population of 250,000 or more</td>
</tr>
<tr>
<td>Midsize</td>
<td>Territory inside an urbanized area and inside a principal city with population less than 250,000 and greater than or equal to 100,000</td>
</tr>
<tr>
<td>Small</td>
<td>Territory inside an urbanized area and inside a principal city with population less than 100,000</td>
</tr>
<tr>
<td><strong>Suburb</strong></td>
<td></td>
</tr>
<tr>
<td>Large</td>
<td>Territory outside a principal city and inside an urbanized area with population of 250,000 or more</td>
</tr>
<tr>
<td>Midsize</td>
<td>Territory outside a principal city and inside an urbanized area with population less than 250,000 and greater than or equal to 100,000</td>
</tr>
<tr>
<td>Small</td>
<td>Territory outside a principal city and inside an urbanized area with population less than 100,000</td>
</tr>
<tr>
<td><strong>Town</strong></td>
<td></td>
</tr>
<tr>
<td>Fringe</td>
<td>Territory inside an urban cluster that is less than or equal to 10 miles from an urbanized area</td>
</tr>
<tr>
<td>Distant</td>
<td>Territory inside an urban cluster that is more than 10 miles and less than or equal to 35 miles from an urbanized area</td>
</tr>
<tr>
<td>Remote</td>
<td>Territory inside an urban cluster that is more than 35 miles from an urbanized area</td>
</tr>
<tr>
<td><strong>Rural</strong></td>
<td></td>
</tr>
<tr>
<td>Fringe</td>
<td>Census-defined rural territory that is less than or equal to 5 miles from an urbanized area, as well as rural territory that is less than or equal to 2.5 miles from an urban cluster</td>
</tr>
<tr>
<td>Distant</td>
<td>Census-defined rural territory that is more than 5 miles but less than or equal to 25 miles from an urbanized area, as well as rural territory that is more than 2.5 miles but less than or equal to 10 miles from an urban cluster</td>
</tr>
<tr>
<td>Remote</td>
<td>Census-defined rural territory that is more than 25 miles from an urbanized area and is also more than 10 miles from an urban cluster</td>
</tr>
</tbody>
</table>

From Provasnik et al. (2007).
Rurality, region, and health outcomes. Characteristics associated with rurality in the U.S. are often different based upon region. This feature is a significant reason that researchers who study rural populations on a national basis often generate conflicting results and it emphasizes the validity of a regional approach to spatial inequality. In an Iowa study, rural children were found to engage in more LTPA than urban children (Joens-Matre et al., 2008) while children in rural Mississippi were found to be less active than their urban counterparts (Harrell et al., 2005). These differences are indicative of different social and economic realities found in rural areas. For example, approximately 40% of rural students in Iowa participate in free or reduced lunch programs (a key indicator of SES) compared to approximately 75% of students in rural Mississippi (Joens-Matre et al.). Similarly, McMeeking and Purkayastha (1995) found that adolescents in a rural fringe area of New England had fewer barriers to participation in leisure activities than urban and suburban adolescents. However, the median annual family income for their rural sub-sample was approximately $50,000 higher than their urban sub-sample and over $10,000 higher than their suburban sub-sample. Lichter, Roscigno, & Condron (2003) suggest that affluent rural areas in some parts of the country often obscure inequalities that exist in poor rural areas in other parts of the country. For example, Figure 3 below, taken from Reis et al (2004), demonstrates the interaction between rurality and region in the study of physical activity. Rural and urban differences in LTPA and obesity are often observable only in Southern samples (S. L. Martin et al., 2005).
Figure 3. Prevalence of Physical Inactivity by Community Type and Region. Adapted from Reis, Bowles, DuBose, Smith, & Ainsworth (2004)
Compositional factors and obesity in the rural South: The rural South has numerous unique compositional features that explain much of the variance associated with the spatial inequality of health in rural areas. The rural South is home to 91% of all rural dwelling African Americans in the United States (R. P. Harris & Worthen, 2003). In fact, the rural “Black Belt” which spreads from eastern Texas to Virginia and includes rural counties in Louisiana, Arkansas, Mississippi, Tennessee, Alabama, North Carolina, South Carolina, Georgia, and Florida contains 45% of the entire African American population (Wimberley & Morris, 1997). Additionally, the rural South has experienced a tremendous in-migration of Latinos over the past decade. The Latino population in the rural South increased 202.6% between 1990 and 2000, which was nearly double the growth in this population seen in the rural Midwest and urban West, the next fastest-growing regions in the country (Saenz & Torres, 2003).

Another important characteristic of residents of the rural South are that they generally experience lower incomes than individuals in non-rural areas and are more likely to live in poverty. Individual economic deprivation in the rural South is especially high among racial and ethnic minorities (Jensen et al., 2003). Low levels of viable jobs and federal welfare policies that may unfairly punish rural residents have created the presence of persistent chronic poverty in rural areas throughout the southeastern U.S. (Sharp & Parisi, 2003). Because members of economically vulnerable groups are often more focused on meeting basic needs (Wilkinson, 1991), and thus are less likely to meet recommended levels of LTPA
(Giles-Corti & Donovan, 2002), the rural South contains a higher concentration of at-risk individuals.

Finally, one of the most significant predictors of healthy lifestyle is educational attainment (J. E. Jackson et al., 2005). Better educated people are more likely than those who are less educated to adopt or modify individual behaviors to improve health and to encourage their children to engage in healthy activities (Macintyre, 2000). Rural areas generally face significant educational deficits in comparison to non-rural areas in the U.S. (Lichter et al., 2003). Whether due to spatial inequalities in the educational process, disproportional numbers of high school dropouts, the out-migration of higher educated individuals, or a combination of factors, rural areas are often less well-educated than non-rural areas of the U.S.

For the rural South, individual factors that are key predictors of risk for overweight and obesity and physical inactivity converge (e.g., high minority populations, low educational attainment, and persistent poverty). The concentration of these at-risk individuals within the rural South explains a significant portion of the levels of spatial inequality in health-related behaviors in this region. The characteristics of these rural areas in the South, in fact, are not unlike the characteristics usually ascribed to residents of the inner-city core in metropolitan areas throughout the U.S. (an area often described throughout the literature as the quintessential example of spatial inequality). However, there are contextual and collective features of rural areas in the South that further amplify the deprivation experienced by individual residents. These explanations demonstrate how the
environmental characteristics of a geographic place may constrain or, conversely, facilitate behaviors that lead to healthier lifestyles.

*Contextual factors and obesity in the rural South:* The contextual explanatory factors of spatial inequality of risk for overweight and obesity in rural areas fall into three areas: accessibility, mobility, and social support. Children and adolescents who live in rural areas are less likely to have access to resources that promote physical activity as well as healthy eating choices, are more likely to face transportation barriers (both in terms of active transportation and transportation to places and programs that encourage physical activity), and are less likely to receive necessary social supports that encourage physical activity.

Rural communities often have relatively fewer public and private recreation facilities to service their population (i.e., parks, sport fields, swimming pools, and gyms) than suburban and urban areas (Churchill et al., 2007; Parks, Housemann, & Browson, 2003; Patterson et al., 2004; Sanderson et al., 2003; Wilcox, Castro, King, Housemann, & Browson, 2000). More importantly, because of limited community and public resources, rural areas have difficulty providing physical activity programming to large segments of the population (Paluck et al., 2006). In addition to a substantially lower tax base to fund public programs, rural areas often lack sufficient human capital to organize, manage, or lead physical activities. With an over-reliance on limited volunteer or part-time support, recreational physical activity programs that do commence in rural areas are often discontinued due to a loss of interest, time conflict, or out-migration of just one key organizer (Paluck et al.).
Because of the greater distances between households and inhabited places, mobility is more difficult in rural areas (Wimberley & Morris, 1997). The issue of mobility affects rural youth by reducing opportunities for active transportation and increasing the amount of commute times to school, work, and leisure activities and thus reducing the available time for physical activity. It also creates an increased burden upon the parents of non-driving adolescents that may reduce their support of participation in organized physical activities.

Often research in areas related to active living advocate for active transportation within communities in the forms of walking or bicycling. Because of the greater travel distances between locations, rural areas naturally inhibit this type of transportation (Paluck et al., 2006). Additionally, sidewalks and streetlights, environmental features that are important for pedestrian safety, are less frequently available in rural areas (Reis et al., 2004). With de-concentration of economic activity away from rural areas, autonomous community centers which can meet the needs of all residents are disappearing from the American rural landscape (Tigges & Fuguitt, 2003). One of the consequences of this process is that few rural communities can fully develop or maintain the necessary mixed-use built environments that encourage active transportation. A second and more visible outcome of the restructuring of rural economies is the rural dependence on metropolitan areas to meet the needs of its residents. Increasingly, rural residents are commuting to metropolitan areas, or other types of regional economic centers, to work, shop, and engage in social activities. The social impact of these commuting patterns is two-fold. First, the culminating effects of business closures and lost tax revenues because more and more retail expenditures are occurring outside the
community may be devastating to local public programs in rural areas. Second, longer commutes to jobs outside of the local area means that residents have less time to participate in family and community activities (Putnam, 2000; Tigges & Fuguitt, 2003). This means that parents have less time to drive their children to organized physical activity programs or help organize, coach, or officiate youth sports.

Rural school consolidation, ongoing since the 1930s ("Shrinking pains," 2008; Tompkins, Zizzi, Zedosky, Wright, & Vitullo, 2004), has resulted in rural children being bussed long distances from home to attend public schools. A recent study in West Virginia revealed that rural children who attended consolidated schools spent an average of 1.5 hours per day on a school bus, compared to 46 minutes for rural children who attended non-consolidated schools (Tonn, 2007). These students were also less likely to participate in extra-curricular activities than students with shorter daily school bus commutes. Similarly, Sjolie and Thuen (2002) reported a negative association with length of school bus journeys and physical fitness measures among Norwegian children. They also found that rural students lived an average of 18.5 km from school, compared to less than 1 km for children in urban areas.

Since rural communities rarely have provisions for public transportation systems, the distance between places in rural areas is a significant barrier to adolescents with no or limited access to personal transportation (Churchill et al., 2007; McMeeking & Purkayastha, 1995). This issue is particularly salient for low-income rural families (Churchill et al.). Rural students have reported that late activity buses, a policy designed to provide school-to-home
transportation for students who participate in after school extra-curricular programs, are often scheduled to depart prior to the completion of sport practices or contests (McMeeking & Purkayastha). Therefore, students with working parents or no personal transportation are often excluded from these programs. The same may be true for community-based activities. For example, Sjolie and Thuen (2002) found that rural youth covered an average distance of 26.6 km per week by automobile between home and activities, compared to 12.2 km for non-rural youth. Because these results come from a Norwegian sample, where rural spatial dispersion is lower than the U.S., they may underestimate the average travel distances required for rural American youth to access community recreation activities. For rural children, with increased parental commuting to work, greater spatial distance between home and activities, and limited access to public transportation, mobility may be one of the greatest barriers to increasing LTPA.

Finally, rural areas may experience lower levels of social support for participation in LTPA. Social support is a key ingredient in getting people physically active (Mobley et al., 2006). Many studies that examine the factors that motivate adolescents to engage in LTPA discover that this age group wants opportunities to socialize through group activities and rarely participate in LTPA alone (Utter et al., 2006). Because of the spatial distances between places in rural areas, adolescents rarely have opportunities to participate in group-based LTPA outside of organized sport and similar structured activities (i.e., dance). If rural youth have fewer opportunities to participate in these types of activities either through lack of access or lower mobility, then they are less likely to be physically active. Additionally,
increasing financial burdens, as well as time and travel constraints on rural parents may discourage their support for a child’s commencing or continuing participation in organized physical activities (L. V. Moore, Diez Roux, Evenson, McGinn, & Brines, 2008).

Studies have determined that access to spaces and facilities for physical activity, supervised and structured programs, as well as parental social and financial support for participation in organized sport and physical activity programs are key factors for participation in LTPA for youth. Because of fewer financial and human capital resources in rural areas, large segments of the rural population may not have access to physical activity places and programs. Spatial distance further increases barriers to access and social support for rural youth. Finally, parental support, both socially and financially, for participation in organized LTPA programs may be lower in rural areas.

Collective factors and obesity in the rural South: The social-cultural characteristics, historical politics, and traditions of rural areas, particularly in the South, also may inhibit participation in sufficient LTPA which leads to higher rates of overweight and obesity. Rural areas are generally characterized by more conservative values that promote traditional gender roles. Rural women are therefore more likely to be responsible for a greater share of household responsibility, even when working full-time jobs, and are less likely to engage in LTPA (Sanderson et al., 2003). Rural adolescent girls, who often model their mother’s physical activity behavior (Shakib & Dunbar, 2004), rarely perceive adult women as being physically active. Rural girls, in fact, often face much more significant social barriers to LTPA participation than rural boys (Trost et al., 1997). In one sense, through the application
of traditional gender ideology, sport and physical activity may be viewed by rural societies as a male domain. In this sense, women and girls may be seen as invaders both in terms of participants and organizers in recreation programs (Coakley, 2004). Schools and community organizations in rural areas thus may favor sponsoring and supporting sports and physical activities that appeal more to male participants. For example, in a study that tracked national gender inequality in high school sport opportunities since the passage of Title IX, states with higher rural populations demonstrated lower levels of gender equity (Braddock II et al., 2005). The ten states with the highest gender equity in high school sports opportunities had a combined rural population of 7,433,000 (24.4% of total population) compared to the lowest ten states’ rural population of 13,807,000 (37.4%). Half of the ten states with the lowest gender equity were concentrated in the South.

In addition to fewer opportunities available, rural adolescent girls may receive less encouragement from significant others such as friends, teachers, or family members, to participate in LTPA. Traditional gender ideology, which may be more pronounced in rural areas, suggests that athletic ability and participation in sport and physical activity should only be celebrated in males. Females who participate in physical activities, other than for cosmetic fitness, beyond a certain age may be labeled as “masculine” (Shakib & Dunbar, 2004, p. 286). This type of social discouragement causes many girls to drop out of sport participation as they enter adolescence. Additionally, adolescent girls may be more restricted in their leisure time than adolescent boys due to expectations associated traditional gender roles. In a largely rural sample, Manke, Seery, Crouter, and McHale (1994) found that
female children reported nearly 2.5 times more daily minutes of domestic labor than male children in dual-earner households.

Other groups, such as racial and ethnic minorities and members of lower SES groups may also face socio-cultural and institutionalized barriers to participation in LTPA in rural areas. Historical discrimination of these groups from public and commercial places in the rural South in particular may leave a durable legacy of these groups not feeling welcome to participate in traditional community programs. In practice, local rural policy-makers often make decisions that favor one set of special interests over others, rather than benefiting the entire community (G. P. Green, 2003). Since the process of distributing community resources may be controlled by local power elites (Mills, 1956) and closed to marginalized groups (Beaulieu, Israel, & Wimberley, 2003), it becomes difficult to create new public programs or accessible opportunities for disadvantaged populations in rural areas. When rural communities, such as in the Midwest, Northeast, and parts of the West have more homogenous social structures and populations, they may have more democratic processes for community development and resource allocation (Swanson & Brown, 2003). When rural communities are more heterogeneous and socially unequal, like in the “Black Belt” South, the special interests of social elites often inhibit community action and the equitable distribution of community resources (Wilkinson, 1991). This difference may explain why rural communities in the Great Plains have made greater public investments in people, such as in education, education, and health care (Swanson & Brown).
In summary, living in rural areas may create barriers to LTPA and in particular, rural environments may amplify individual deprivations that constrain healthy lifestyles. Rural areas, especially in the South, are comprised of individuals of lower socio-economic status that are less likely to engage in positive health behaviors. However, certain structural contexts of rural environments, such as fewer public recreation resources, spatial distance between locations, and social isolation may further inhibit active living. Finally, collective traditions, norms, and historical features of many rural areas may create added barriers to LTPA for disadvantaged groups.

Differences in built, natural, and social environments that facilitate or constrain LTPA in adolescent populations between rural areas and other parts of the U.S. suggest that intervention strategies for these areas will also be different. Because rural communities represent a drastically different design from urban and suburban forms of community, “one size fits all” programs may not be effective (M. C. Nelson et al., 2006). Since active transportation and natural social interaction is not always possible in rural communities, organized and structured physical activity programs may be more important than in suburban and urban communities (J. B. Moore et al., 2008). Increasing accessibility and support for these programs to all groups of adolescents, regardless of race, gender, social class, skill, or ability should be a priority. Schools may be ideally positioned in rural areas to provide structured environments that promote LTPA to all students through their use of extracurricular programming (Felton et al., 2002; Floyd, Bocarro, & Thompson, 2008;
Tompkins et al., 2004; Young et al., 2007). In the next section, the role of school environments to support LTPA for adolescents will be discussed.

School Environments for LTPA

All adolescents in the U.S. are legally required to attend school. For a significant majority of these adolescents, a large amount of their daily lives are spent in public school facilities, participating in school programs, and interacting with school personnel. Through patterns of contact, adolescents are generally familiar and comfortable with their own school environments (Wechsler et al., 2000). Schools, therefore, are uniquely situated to provide supportive LTPA environments for a large number and diverse range of adolescents through their use of curricular and extracurricular programming, access to school-owned facilities such as gymnasiums and fields, the employment of trained physical education professionals, and existing transportation systems (Centers for Disease Control and Prevention, 1997; Cleland et al., 2008; Cohen, Scott, Zhen Wang, McKenzie, & Porter, 2008; Felton et al., 2002; Floyd, Bocarro et al., 2008; Lobstein et al., 2004; Lounsbery et al., 2007; McNeill et al., 2006; Sallis et al., 2001; Wechsler et al., 2000; World Health Organization, 2003; Young et al., 2007). Public school systems also have opportunities to bridge gaps in the public recreation by partnering with community organizations to maximize physical resources such as facilities and offer a broader array of LTPA across the community (Estabrooks et al., 2008; McKenzie, 2001; Trost et al., 1997).
School-sponsored physical activity is delivered in two formats. The first is curricular physical education. The State of North Carolina defines curricular physical education within their Healthful Living Standard Course of Study as:

A planned, sequential program of curricula and instruction that helps students develop the knowledge, attitudes, motor skills, self-management skills and confidence needed to adopt and maintain physically active lifestyles.

The physical education setting, whether the gym, field, or multipurpose room, is the classroom in which the curriculum of physical education is conducted and is taught by a licensed physical education specialist. This class should be treated with the same level of professional concern as other learning environments. (N.C. Department of Public Instruction, 2006, p. 18).

In this sense, schools use physical education as an antecedent for physical activities, providing instruction in the benefits of healthy behaviors and teaching skills that can be applied in physical activity settings. As an additional component to its physical education requirements, North Carolina’s public schools must provide 30 minutes of daily compulsory physical activity for middle school students. For middle schools, this physical activity can be delivered through physical education classes, dance classes, classroom energizers, or other “curriculum-based physical activity program” (N.C. Department of Public Instruction, 2006, p. 88).

*Extracurricular physical activity.* Research and policies aimed at increasing adolescent physical activity and reducing childhood obesity have overwhelmingly been focused on compulsory curricular physical education (Cawley et al., 2007). However, results linking curricular physical education policies and adolescent physical activity have been mixed (Cawley et al.; Lonsdale, Sabiston, Raedeke, Ha, & Sum, 2009). Though increased
emphasis on physical education is expected to provide adolescents with short-term increases in physical activity, the long-term ability of curricular physical activity to encourage LTPA has been questioned (Floyd, Bocarro et al., 2008; Roberts, 1995). A key determinant in fostering habits that lead to increased LTPA is providing adolescents with choice and freedom in participation (Lonsdale et al., 2009). Therefore, extracurricular physical activities are expected to have a significant benefit in encouraging adolescent LTPA, decreasing obesity, and reinforcing healthy lifestyles (Ara et al., 2006; Lobstein et al., 2004).

Extracurricular activities occur outside of the physical education curriculum (usually before or after the required school day), are voluntary for students, and can use school personnel, adult volunteers, or outside organizations for supervision (Floyd, Bocarro et al., 2008; Jago & Baranowski, 2004; Lounsbery et al., 2007). There are three types of extracurricular physical activity programs offered in school environments: interscholastic sports (sports programs featuring competition between representatives of different schools), intramural sports (sports programs offering competition among students within a school), and physical activity clubs (student groups that meet periodically to participate in non-competitive physical activities such as walking, hiking, or dance)(McKenzie et al., 2000).

For adolescents worldwide, an important form of structured LTPA is participation in organized sport (M. J. Moore & Werch, 2005). Sport is a specialized form of LTPA that emphasizes competition, specialization, and both intrinsic and extrinsic rewards (Coakley, 2004). Participation in sport programs can be an essential part of a physically active and healthy lifestyle for youth (World Health Organization, 2003). Phillips and Young (2008)
found that ninth grade girls who participated in sports averaged more weekly physical activity than girls who did not participate in sports. Sports participation may be one of the strongest predictors of moderate to vigorous physical activity particularly among adolescent girls (Trost et al., 1997). Additionally, sport participation in adolescence may lay the foundation for increased physical activity and healthier lifestyles into adulthood. Generally, children who participate in sports are significantly more likely than non-participants to be physically active adults (Curtis et al., 1999; K. Green et al., 2005; K. E. Powell & Dysinger, 1987).

Some researchers, however, have argued that sport participation does not necessarily lead to all types of superior health outcomes. For example, Walters, Barr-Anderson, Wall, and Neumark-Sztainer (2009) found that for low SES adolescents, levels of LTPA dropped at a faster rate in adulthood among sport participants than non-sport participants. Adults rarely participate in sports, and are more likely to get LTPA through walking, exercise, or household chores (Ham, Kruger, & Tudor-Locke, 2009). Beets and Pitetti (2005) found that while adolescent girls who participated in sports performed better in fitness tests than non-participants, there were no significant differences in body-mass indices (BMI) between these groups.

Critics have also suggested that organized sport fails to deliver recommended levels of physical activity to enough participants in comparison to unstructured or non-competitive activities (for example, see Louv, 2005). Indeed, Thompson, Rehman, and Humbert (2005) suggest that heavily structured or competitive activities may attract participation from many
adolescents, but may discourage others from participating. Adolescent girls, for example, seek a wider variety of leisure-time physical activities than are generally offered by sports programs and prefer lifelong and cooperative physical activities (e.g., dance) over team sports and competitive activities (Barr-Anderson et al., 2007; Birnbaum et al., 2005; Felton et al., 2002). Additionally, many girls are socialized in adolescence to see organized sports as a masculine activity (Sage, 1998; Schmalz & Kerstetter, 2006). Therefore, considering the limitations sport has to encourage LTPA participation for some groups of adolescents and to mediate adult physical activity, many researchers and advocacy groups to suggest offering a broader range of competitive and non-competitive physical activity programs to include as many interested adolescents as possible (Floyd, Bocarro et al., 2008; K. Green et al., 2005; Lobstein et al., 2004; World Health Organization, 2003).

While extracurricular programs in schools have the potential to promote LTPA among a wide range of students, schools in U.S. often organize extracurricular physical activity in a way that excludes many students from participation, prioritizing interscholastic sports for a school’s best athletes, rather than intramural sports or physical activity clubs. For example, in 2006 interscholastic sports were offered in over 80% of middle schools, while fewer than half offered intramural sports (U.S. Department of Health and Human Services: Centers for Disease Control and Prevention, 2007). With intense competition between schools and winning often emphasized as a primary goal, interscholastic sports are designed specifically to only include a school’s most talented athletes. Additionally, school policies often prevent sixth graders from participating in interscholastic sport programs, in
some cases excluding 1/3 of a school’s student population. While significant benefits may accrue to those students who participate in these sports, many interested students may be prevented or discouraged from participation. The prioritization of standardized testing under the ‘No Child Left Behind’ Act, and reductions in overall school funding, have led to a de-emphasis of extracurricular physical activities in recent years in favor of academics (Datar & Sturm, 2004; Floyd, Bocarro et al., 2008; Roscigno, Tomaskovic-Devey, & Crowley, 2006). Business, political, and education leaders have increasingly reduced the importance of physical activity as part of the educational process, citing the need for students to focus more on academics and therefore compete in the new global economy.

The role of sport in U.S. school environments. The justification of physical activity as part of schools in the U.S. traces its origins to ancient Athens and the writings of Plato (1902) and his ontological belief in the harmony of mind and body. German educational reformer Johann Basedow, included physical education as part of his comprehensive secondary school program in the 1700s (Mechikoff & Estes, 1998). These philosophical foundations were grounded in the belief that physical activity’s role was building healthier bodies. The Muscular Christianity movement that emerged in Protestant Britain in the mid-1800s connected sport with Plato’s philosophy of building the soul and the development of moral character. Proponents of Muscular Christianity believed that true Christian men needed a balance of physical and spiritual harmony (Putney, 2001). Within this ideology, team sports began to emerge as the principal physical activities at British private schools. The publication of Tom Brown’s School Days by Thomas Hughes in 1856 was a catalyst for
the almost immediate spread of this movement to the United States. Hughes portrayed characters who were strong, virtuous young men and served as idealized versions of Protestant, Victorian youth. Subsequently, this image was adopted for the *Frank Merriwell* books in the U.S. that portrayed the “All-American” boy and the flood of similar boys’ books that followed. Extracurricular school sports were central to the development of this idealized manly vision and private schools in the Northeast quickly started after-school sports programs (Miracle & Rees, 1994).

While British schools tended to encourage the gentlemanly aspects of fair play and sportsmanship, American schools quickly began to overemphasize winning as the ultimate goal of their sports. In the 1800s, several schools in the U.S. were even accused of paying highly-skilled professional athletes who were not students to play for their teams (Mirel, 1982). By the end of the 19th century, political and business leaders were linking victory in athletics, rather than participation, to moral superiority (Miracle & Rees). Today, interscholastic school sport remains the most popular and costly extracurricular activity in American schools (Broh, 2002). Miracle and Rees (1994) suggest that school athletics have become a cultural phenomenon over the past 150 years, as important in the U.S. as “bullfighting in Spain or *carnival* in Brazil,” (p. 24). Interscholastic sport is often recognized as a quintessential “All-American” institution and as an identifier of the preferred ideological values of the cultural mainstream. Therefore, as extracurricular activities became increasingly extraneous to academics, extracurricular school physical activity has
increasingly become relevant solely as the public ritual of interscholastic school sports (Miracle & Rees, 1994).

Rather than using extracurricular physical activity as a means of improving the health of students, many schools have emphasized interscholastic sport’s importance as a revenue generator, in providing a means for a small number of elite student-athletes to enter college or professional sports programs, and connecting communities and building school spirit as towns rally around their teams. While school sport has always attracted spectators, school sports as entertainment has become much more central to its existence in contemporary society. This idea is especially true in rural areas that lack in other entertainment options and communities that are tied to old economic values (Miracle & Rees).

Supportive environments for LTPA in schools. Despite criticisms against them, interscholastic school sports may provide health benefits for participants. Ara et al. (2006) found a link between sport participation and lower fat mass amongst adolescent boys. It has also been demonstrated that participation in sports during adolescence is positively associated with higher levels of LTPA in adulthood (Campagna et al., 2002; Curtis et al., 1999; K. Green et al., 2005; Telama et al., 2005). The CDC recommend the offering of interscholastic sport in schools as an essential component of LTPA promotion (Centers for Disease Control and Prevention, 1997; Wechsler et al., 2000). However, the benefits of participation in interscholastic sports are only available to the students who are skilled enough to compete and make the team. Additionally, adolescent attrition from sport programs is high (Hedstrom & Gould, 2004). Therefore, the WHO (2003) suggests that a
combination of all three types of extracurricular physical activity programs is an important mechanism to increase adolescent physical activity. They argue that inclusive programs that promote a broad range of competitive and non-competitive activities provide the best opportunity to encourage LTPA participation to the most adolescents (Koplan, Liverman, & Kraak, 2005; Lobstein et al., 2004; World Health Organization).

A growing body of research has emerged that supports the introduction of broader extracurricular physical activity programs, including intramurals, in middle schools (Bocarro et al., 2006; Floyd, Bocarro et al., 2008; Koplan et al.; Wechsler et al., 2000). Many health leaders, including the U.S. Surgeon General, recommend the inclusion of intramural sports programs along with interscholastic sports, suggesting these programs have a greater potential for improving rates of physical activity in more adolescents (U.S. Department of Health and Human Services, 2001; Wechsler et al., 2000). The National Association of Sport and Physical Education (NASPE) goes further in their 2002 position paper arguing that intramurals and non-competitive activities are more developmentally appropriate for middle school-aged adolescents and should be prioritized over interscholastic sports that often simply mimic high school programs (National Association for Sport and Physical Education, 2002).

As indicated by NASPE, the popularity of interscholastic sport over intramurals and non-competitive physical activities is particularly problematic in middle schools, which generally comprise grade levels six through eight (ages 11 to 13) (N.C. Department of Public Instruction, 2004). Participation in sport significantly declines among middle school-aged
children for a variety of reasons (Leppke, 2003). A key contributor to the attrition of many adolescents from sport is their reduced enjoyment of the highly-competitive environment of interscholastic sport (Butcher, Lindner, & Johns, 2002; Seefeldt, Ewing, & Welk, 1992). Adolescents seeking less competitive sport and casual physical activity programs face barriers to participation when school extracurricular programs encourage elite competition and value technical skill development. A similar effect may also be occurring outside of school for this age group. While opportunities still exist in some communities for students to participate in more casual physical activity settings, many parents and sponsors are progressively emphasizing a performance ethic in adolescent sport (Coakley, 2004). The prominence of this approach has led to the increased prevalence of travel teams, tryouts, and specialization in youth and adolescent sports both in school and recreation settings.

Broader extracurricular physical activity programs that include intramural sports and non-competitive physical activities in addition to interscholastic sports have been increasingly promoted as a more inclusive approach, based on several potentially beneficial characteristics. First, they can provide students with an unlimited variety of sports and physical activities from which to choose (Leppke & Tenoschok, 2003). This benefit contrasts with interscholastic sports that require schools to organize sports that are identical to those offered at competing schools or sanctioned by state associations. Additionally, with fewer funding requirements than interscholastic sports (i.e., uniforms, equipment, and travel), resources can be spread across more activities. The second benefit of these programs is that students can be more involved in the process of organizing and planning the activities.
(National Intramural Sports Council, 1995). An interactive process of planning the school-sponsored activities may lead to increased buy-in from students and encourage higher levels of participation. Third, and most importantly, these programs are more inclusive of all interested students. Intramural sports and physical activity clubs provide opportunities for all skill levels to participate (Wechsler et al., 2000). More students may also have the opportunity to participate in more casual physical activity programs due to their reduced time requirements. Finally, because school programs that offer intramurals and physical activity clubs are more likely to focus on having fun and socialization over competition. Therefore, some of the main reasons given by middle school students (i.e., social life and time constraints) to explain their lack of interest in sport participation may be overcome in this type of environment.

*Characteristics of supportive environments.* As stated earlier, supportive environments for LTPA reduce individual constraints and encourage participation while less supportive environments may prevent participation even when individuals are motivated (Elder et al., 2007; O'Donnell, 2005; Thompson et al., 2005). Supportive environments make it easy for individuals to be physically active (Estabrooks et al., 2008; Stokols et al., 2003). Overall, creating or enhancing places and programs for physical activity can increase the number of people who participate in LTPA (Floyd, Spengler et al., 2008). Since 2000, the CDC and the U.S. Department of Education have been issuing guidelines and strategies to promote physical activity in schools (Young et al., 2007). In relation to LTPA in school settings, and based on the policy goals stated by these groups, several characteristics of
supportive environments have been identified: An adequate number and variety of safe facilities (Wechsler et al., 2000); A broad variety of programs that appeal to a wide range of adolescents (e.g., interscholastic sports, intramural sports, physical activity clubs, and free play) (Centers for Disease Control and Prevention, 1997; Floyd, Bocarro et al., 2008; Leppke & Tenoschok, 2003; Lounsbery et al., 2007; National Association for Sport and Physical Education, 2002; Tompkins et al., 2004; Wechsler et al., 2000; Young et al., 2007); inclusive school policies that reduce individual constraints (e.g., no-cut policies, late activity buses, teams for multiple skill levels, adaptive programs for students with disabilities, absence of participation fees) (Canadian Association for Health, 2005; Jago & Baranowski, 2004; Sallis et al., 1998; Young et al., 2007), linkages between school and community (e.g., access to school facilities for community use, partnerships with community organizations, involvement of parents and community volunteers) (Centers for Disease Control and Prevention, 1997; McKenzie, 2001; National Association for Sport and Physical Education, 2002; Tompkins et al., 2004; Wechsler et al., 2000).

Another important component of facilitating LTPA in schools is through active transportation (i.e., students walking or biking to and from school) (Jago & Baranowski, 2004; National Association for Sport and Physical Education, 2008; Tompkins et al., 2004; Young et al., 2007). While this characteristic of school environments should be considered, opportunities to modify environments to encourage active transportation often go beyond the scope of schools and school policy and require modifications to school construction policy, local transportation patterns, and urban design throughout the community (Jago &
Baranowski, 2004). Additionally, outside of urban environments, suburban and rural students are more likely to attend school outside of their community and therefore require mechanized transportation to school (Thompson et al., 2005).

Very little information is available in the research literature or from government agencies that attempts to investigate the extent to which schools are implementing the recommendations in improve environmental supports for LTPA in schools (Young et al., 2007). Additionally, few attempts have been made to aggregate school-level information to assess composite school environments. The only study that combined school-level environmental characteristics to calculate a score to assess overall school environments for LTPA emerged from the Trial of Activity for Adolescent Girls (TAAG) (Young et al.). Young et al. found a relationship between composite school SES and environmental support. While studies of overall school environments for LTPA are lacking, examining individual characteristics of supportive environments for LTPA in schools reveals patterns of inequality and deprivation amplification in these contexts.

**Inequalities in supportive school environments for LTPA.** Children who attend schools in disadvantaged areas are more likely to have negative environmental conditions that discourage participation in LTPA. Because the U.S. educational system traditionally funds schools through local property taxes (Roscigno, 2000), wealthy school districts with higher property values receive higher budgeted per pupil expenditures and increased funding for extracurricular activities, such as sport and other physical activities (Eitzen, 1996). School districts with high minority populations are more susceptible to having poorly funded
schools due to having lower tax bases from which to draw funds (Roscigno, 2000). Thus, family disadvantages and enduring racial neighborhood segregation translates into disparities in school resource allocations across school districts (Roscigno, 2000).

Condron and Roscigno (2003) also found that per pupil expenditures within local school districts corresponded to the racial and class composition of individual schools. Racial segregation in U.S. schools is quietly increasing and the population of African American students attending segregated schools is quickly approaching pre-Civil Rights Era levels (Shapiro, 2004). Schools that are comprised of more affluent, white students are likely to receive a disproportionately high amount of financial resources for physical plants as well as curricular and extracurricular programming. Conversely, being a racial or ethnic minority is “often synonymous with attending a school that is dilapidated, overcrowded, unsafe, and unhealthy” (Condron & Roscigno, 2003, p. 20). District budgets are established locally, resources are allocated through the discretionary decisions of local school boards. These processes are more likely to follow the practices of local stratification arrangements (Condron & Roscigno). Rather than being based on specific policy formulas or social need, local school boards seem to be more vulnerable to a consumer approaches that provides more opportunities to families with higher social status and more personal economic resources (Kerckhoff, 1995). Similarly, poor and minority constituencies are more likely to be excluded from local political systems, and decisions become driven by concerns relevant to more affluent, socially active elites. Because of the social and economic conditions of their student population, more affluent schools appear to be better organized in approaches for
increased funding from local school boards (Condron & Roscigno). Although not significantly researched, it is expected that external funding and human resources play a significant role in enhancing public expenditures for recreational facilities (Smoyer-Tomic et al., 2004). Affluent white schools are also more likely to have active Parent-Teacher Associations and similar organizations with high levels of social capital that can mobilize volunteers and attract private donations to construct, maintain, or improve school spaces and facilities.

However funding disparities materialize, the school communities most in need of improved facilities for LTPA are the least likely to have access to the resources necessary to provide these amenities (Sallis et al., 2001). Parents of students in schools with high concentrations of racial and ethnic minorities and students of low SES generally perceive that their school’s facilities for LTPA are of inferior quality compared to more affluent schools (Romero, 2005). It is important to distinguish that school-level effects related to physical activity and health promotion are often stratified by school SES. While class segregation is often indistinguishable to racial and ethnic segregation in the U.S., socio-economic status, rather than racial and ethnic composition of schools, is usually the key predictor of average BMI and levels of LTPA in schools (Richmond & Subramanian, 2008). It is possible that high minority schools lack material resources for LTPA primarily because they are also economically disadvantaged. For example, even after controlling for school racial composition and individual demographic characteristics, Richmond and Subramanian found statistically significant variation in BMI across schools based on SES.
For disadvantaged neighborhoods most at risk for childhood obesity, schools can provide essential physical amenities to encourage LTPA among children (M. M. Scott et al., 2007). From this perspective, poor material infrastructure at these school locations could be a contributing factor in decreased LTPA and consequently increased overweight conditions among students. However, superior school facilities do not guarantee that adolescents will use them to become more physically active (Tompkins et al., 2004). When studying the effects of school facilities on LTPA, McKenzie, Marshall, Sallis and Conway (2000), for example, failed to find a significant relationship when these facilities were examined in isolation from other contextual factors. The aesthetics and quality of these facilities are important, but schools and neighboring communities also have to ensure the surrounding area is safe and that facilities are accessible (Day, 2006; Sampson et al., 1999). Additionally, improved facilities should only be considered within the context of a multi-dimensional approach to increasing LTPA (Wechsler et al., 2000). In school environments, LTPA programming may play a more significant role than facilities in encouraging LTPA (Cohen et al., 2008). According to Wechsler et al., “Creative administrators and staff can develop excellent services with only modest facilities, while having state-of-the-art facilities does not ensure a quality program” (p. S127).

Because of the suggested key role of structured programming for LTPA in school environments (Romero, 2005; Sallis et al., 2001), the quality of organized extracurricular activities may be a significant factor in determining the activity levels of children within a school. Additionally, schools need late activity buses, waivers of fees and other costs of
participation, and other inclusive policies that improve the accessibility of these programs for adolescents of disadvantaged backgrounds (Wechsler et al., 2000; Young et al., 2007).

School-sponsored programs for LTPA provide many low income minority parents the only option for organized sport and physical activities for their children (Outley & Floyd, 2002), often due to insufficient neighborhood facilities and inaccessible community recreation resources. Like other school resources, however, there is substantial evidence to suggest potential social disparities in the availability of LTPA programs in schools. In a national sample of high schools, Johnston, Delva and O’Malley (2007) found a significant negative correlation between school SES and racial composition and the availability of interscholastic sports, intramural sports, and non-competitive physical activity clubs. In addition to possessing inferior facilities and equipment for sport and physical activity, extracurricular LTPA programming in disadvantaged schools is often extremely limited by reduced budgets and lower stipends for teachers who might organize these programs (Outley & Floyd, 2002).

This finding calls attention to a significant issue related to extracurricular physical activity in schools. For numerous historical, cultural, and ideological reasons described earlier, the predominant form of extracurricular physical activity programming is competitive interscholastic sport. Because these programs usually exclude students who lack athletic skills, they are reserved for elite athletes within the school population (Pedersen, 2005). They also require more serious time commitments and financial investments from students and parents. Since socialization into these sports requires past experience, these programs also discourage students who want to take up participation for the first time. Affluent
schools have more available resources to support larger interscholastic programs with several sports as well as intramurals and non-competitive physical activities that encourage participation from a wider range of students. Higher SES schools with fewer minority students provide more sports, teams, and extracurricular physical activities than schools with a higher concentration of low SES and minority students (Cohen et al., 2007; Fejgin, 1994).

When financial and physical resources are limited for extracurricular activities schools often focus those resources to emphasize interscholastic sports because of their social and cultural value. This pattern is particularly true within low income minority communities that value competitive sports as the primary means of gaining status and social mobility (Edwards, 1986). Because of the cultural value placed upon certain sports, particularly football and men’s basketball, as potential providers of college scholarships and professional contracts, disadvantaged schools may overemphasize these exclusively male sports (O. Harris, 1994). The prioritization of male spectator sports within the school environment comes at the expense of other activities and may contribute to a differential effect of school environments based on gender. In a national sample of 17,000 teens in the Add Health study, Richmond et al (2006) found no differences in LTPA participation across schools for minority boys. Regardless of school setting, African American and Hispanic boys reported higher participation in LTPA than white boys. Conversely, they found that physical activity levels for girls were dependent on the school attended. Within every type of school, African American, Hispanic, and white girls all reported similar levels of LTPA, however girls attending more affluent schools reported significantly more LTPA participation than girls
who attended poorer schools. Because minority girls are likely to attend poorer schools with fewer programming resources for LTPA, they may be more disadvantaged than their male peers in terms of perceiving opportunities to be physically active at school (W. C. Taylor et al., 1999).

The school environment has an undeniable role in contributing to levels of LTPA among children. Access to supportive environments in schools can increase LTPA, potentially leading to decreased rates of overweight and obesity, particularly among low SES and minority children. The role of the school in promoting healthy behavior among this population may be especially important among racial and ethnic minority girls. However, children live their lives in numerous interrelated environments that can either facilitate or constrain physical activity. For example, Erwin (2008a) found that while school facilities were important, school environments influenced levels of LTPA less than neighborhood environments. Indeed, since children spend more time out of school than in school (Downey, von Hippel, & Broh, 2004), physical activity in school curricular and extracurricular activities, may account for only 20-40% of children’s total LTPA (Cohen et al., 2008). This aspect of children’s LTPA highlights the importance of multiple environments to influence behavior. In particular, it underscores the need for low SES and minority children to also have accessible opportunities to be physically active outside of school in their neighborhoods and communities and follows recommendations for increased linkages between schools and community organization to deliver LTPA.
Disadvantaged neighborhoods are often marked by high social disorder, low social capital and low collective efficacy, all environmental characteristics that reduce the likelihood of children participating in physically active leisure in neighborhood settings (Wen et al., 2007). These neighborhoods also commonly lack material resources, such as recreational facilities, that support LTPA programs. Children who live in more affluent areas not only have more personal family resources, (i.e., transportation and money for equipment and registration fees), which allow them to participate in varying types of LTPA programs across a wider geographic space, but are more likely to have accessible and higher quality public recreational spaces in close proximity to their homes (Smoyer-Tomic et al., 2004).

The use of school environments for LTPA delivered by public and nonprofit organizations, as well as unstructured sport and physical activity, may be especially important in low SES neighborhoods to mitigate these disparities (Day, 2006). However, due to neighborhood social conditions, children living in deprived neighborhoods are more likely to live near schools that are inaccessible outside of school hours (M. M. Scott et al., 2007).

In summary, because of patterns of contact, available facilities, and familiarity, schools may be ideally positioned to provide LTPA opportunities for adolescents. Schools deliver physical activity through curricular physical education and extracurricular activities. While substantial research and policy measures have focused on increasing amounts of compulsory curricular physical education in schools, little is known about policies and programs for extracurricular physical activity. Extracurricular physical activities have shown significant benefits in increasing LTPA for adolescents in the short-term and long-term
beyond those provided by physical education. Extracurricular activities can be organized as interscholastic sport, intramural sport, or non-competitive physical activity clubs, although historically competitive interscholastic sport has been prioritized in the U.S. educational system. There have been increasing calls to create supportive environments for LTPA in schools through the provision of adequate facilities, broad extracurricular activities that include intramurals and non-competitive activities in addition to interscholastic sports, inclusive policies, and linkages with members of the larger community. Though few studies have attempted to explore this area of school-sponsored physical activity, schools comprised of large numbers of minority students and students of low SES are less likely than affluent schools to have sufficient environmental supports for LTPA.

School environments, rural communities, and deprivation amplification. Examining place disparities in access to high quality school environments remains an understudied area (Roscigno et al., 2006). Inner cities and rural areas differ substantially from suburban communities in the availability of resources that have the potential to increase life chances. The variation in resources within these areas creates distinct advantages and disadvantages for individuals living in those communities that can generate and reproduce inequality. In terms of place disparities for supportive environments for LTPA in middle schools, the question is to what degree is geographic variance based upon compositional, contextual, or collective effects.

Differences in school environments based upon geographic location may be a result of the composition of school population, rather than any contextual or collective factors. The
decline of the U.S. manufacturing sector left the industrial inner city with a poor, low-wage minority population (Wilson, 1996). Similarly, the reduction of agriculture in rural America has marked these areas with high unemployment, low-wage service sector jobs, and persistent poverty. People living in the inner city or rural areas may choose not to invest in educational programs or institutions based on a perceived lack of substantial return to the local community or their need to prioritize fulfilling more basic needs (Cohen et al., 2007; Roscigno et al., 2006). Disparities in supportive environments for LTPA found in inner city and rural schools may be a product of higher concentrations of students from lower-SES families. Conversely, suburban schools comprised of students with higher family resources and investments in schools are expected to offer more curricular and extracurricular programs.

While school composition is expected to explain part of the place disparities related to supportive environments for LTPA, investments in schools will often be determined a great deal by the availability of community resources. These resources are expected to be lower in inner city and rural schools than in suburban schools. However, because school funding occurs on a district-wide basis (generally at the county, rather than the city level) in North Carolina, urban schools are expected to have access to a greater absolute resources for school investment than rural schools. Therefore, rural school programs may be more vulnerable to disparities related to contextual effects.

Finally, because the quality of school programs are a consequence of both the availability of resources and local political processes related to their distribution, local
collective social functioning is expected to influence differences in school environments (Roscigno et al., 2006). In particular, differences in rural patterns of resource allocation are expected to vary significantly based upon the racial composition of schools and communities (Roscigno et al.). While institutional disadvantage based upon social class and racial segregation should be seen in both rural and urban schools, rural communities may be demonstrate a larger contextual disadvantage in school investment. For example, Roscigno, Tomaskovic-Devey, and Crowley found significant residual rural disadvantages related to school resources and investments have been found beyond those explained by compositional and contextual factors and at a greater extent than inner city schools.

In summary, through a complex relationship of compositional, contextual, and collective factors, attending a school located in a rural area amplifies individual constraints to LTPA and potentially leads to health risks associated with childhood obesity. Similar to urban schools, rural schools may be more likely to be segregated by race and populated by low-SES students. Both rural and urban communities are expected to have less funding available for school programs than suburban schools, however rural schools may have access to fewer resources than urban schools. Finally, collective social functioning may further hinder the ability of rural communities to provide sufficient resources for school programs in comparison to urban and suburban schools.
Chapter Summary

This review of literature introduced the societal issues and consequences related to and disparities associated with the distribution of risk for childhood obesity among adolescents. The role of physical activity, and LTPA in particular, as a strategy for reducing rates of childhood obesity was discussed. An overview of the personal-level factors that have been shown to facilitate or constrain adolescent participation in LTPA was presented. The examination of environmental correlates of LTPA, including the social-ecological paradigm was proposed as an alternative approach to understanding adolescent participation. The use of deprivation amplification was introduced as an extension of environmental approaches to explore suggested place disparities in access to supportive environments for LTPA. As evident from the literature, adolescents living in rural communities and other disadvantaged areas are more at risk for physical inactivity and obesity than adolescents in other areas. A contributing factor in this spatial inequality is a lack of access to supportive environments. The potential for schools to provide LTPA was suggested and further explored as a site for reproducing spatial inequality in supportive environments. Because of the limited research on the ways in which spatial inequality emerges, questions were raised about how deprivation amplification may develop in comparisons across rural, suburban, and urban locations.

The purpose of this study is to determine whether local advantages and disadvantages exist in access to supportive environments for extracurricular school physical activity for middle-school aged adolescents in North Carolina. In particular, this study hopes to further
investigate the opportunities rural adolescents have to be physically active compared to adolescents from other communities using the deprivation amplification model to examine differences in supportive environments for LTPA in middle schools. Though evidence has been put forward that describes the existence of place disparities in access to community resources for physical activity, little is known about how this phenomenon emerges in school environments or what characteristics of schools and communities influence the development of this inequality. Comparing how compositional, contextual, and collective factors predict supportive environments for LTPA in schools across the state may lead to better informed policy decisions and interventions to reduce rates of obesity among children who are the most at-risk.
CHAPTER 3: METHODS

The purpose of this study was to determine whether local differences existed in access to supportive environments for extracurricular school physical activity for middle-school aged adolescents in North Carolina. It also examined the key institutional and community systems that influence the provision of LTPA opportunities. LTPA programming is a critical strategy for reducing childhood obesity. Because fewer recreation resources exist for adolescents in rural communities, schools are important to the delivery of LTPA programming. An investigation of disparities in access to supportive environments for extracurricular school LTPA programs was important to understanding the opportunities rural children have to be physically active. This study used Macintyre’s (2000) deprivation amplification model to examine differences in supportive environments for LTPA in middle schools. The underlying goals of this study were to a.) contribute information that will expand the knowledge base about accessibility to physical activity programming in schools and b.) understand how spatial inequality related to health operates on a regional level.

The units of comparative analysis for this study were middle schools. Schools in this sample were clustered within school districts. Through the use of multi-level modeling, I sought to examine how place disparities emerge at the school and community level as well as school district level. Multiple sources of data were integrated to analyze place disparities in access to supportive environments for LTPA in North Carolina middle schools. Data on schools and communities were collected through self-administered web-based questionnaires (see Appendix A), common core data on public schools available from the U.S. Department
of Education: National Center for Educational Statistics (NCES), the North Carolina State Office of Budget and Management Data Center, North Carolina Department of Public Instruction (NCDPI), and the U.S. Census Bureau. Descriptive statistics and univariate analyses were used to compare schools in different geographic locations on individual and grouped characteristics of environmental supports for LTPA. Aggregating environmental supports, a composite index for environmental support for each school was created to use as a single dependent variable. Using linear mixed model techniques to control for non-independence of schools clustered within school districts and to compare school-level and district-level influences on environmental support, regression models predicting environmental support from school compositional factors, community contextual resources and collective social functioning were generated. This chapter outlines the methodology used in this study and is divided into the following sections: research questions and hypotheses, participants, procedures, measures, and data analysis.

Research Questions and Hypotheses

This study sought to determine whether adolescents living in rural areas of North Carolina attend schools with fewer environmental supports for LTPA that those in more urbanized communities. The specific research questions (RQ) this analysis sought to answer were:

RQ1. Do differences in supportive environments for extracurricular sport and physical activity in middle schools exist based upon community location?
RQ2. Are spatial differences explained by compositional characteristics of school populations? If so, what school population characteristics (i.e. enrollment, racial composition, school type, and school SES) predict differences in environmental support for extracurricular sport and physical activity?

RQ3. Controlling for school compositional factors, what aspects of community contextual resources (i.e. economic base) both at the district level and school level influence environmental support for school LTPA programming?

RQ4. Controlling for school composition, what aspects of community collective social functioning (i.e., income inequality, racial heterogeneity, education level, and average commute time) influence environmental support for school LTPA programming?

RQ5. How do school composition, community context, and collective social functioning combine to predict place disparities in access to supportive school environments for LTPA?

The units of comparative analysis were operationalized at both the school and community levels. It was assumed that variance would exist between individual schools, based upon school-level characteristics, but that community contextual and collective factors independent to each school would also influence individual school environments. It was further assumed that observations of different schools located within the same school district would not be independent. Contextual resources and social functioning at the district level is expected to greatly influence spatial differentiation across schools and therefore had to be
accounted for in the analysis. Building upon McIntyre’s theoretical framework, this research is both exploratory and inductive. However, it retains deductive elements that provide the opportunity to test several research hypotheses (H):

H1. Differences in supportive environments for extracurricular sport and physical activity in middle schools will vary based upon community type (i.e., urban, suburban, rural fringe, and rural). Schools located in rural communities will have less supportive environments than schools located in suburban or urban communities.

H2. Spatial differences in supportive environments for LTPA will be partially explained by school composition. Schools with higher concentrations of minority and low-SES students, smaller schools, and extended elementary schools, will have less supportive environments for extracurricular sport and physical activity, regardless of community type.

H3. Controlling for school composition, schools located in school districts and communities with more economic resources (i.e., higher per pupil expenditure, higher median household income) will have more environmental support for extracurricular sport and physical activity.

H4. Controlling for school composition, schools located in districts and communities with higher collective factors (i.e., economic equality, racial homogeneity, more educated residents, and lower commuting times to work) will have more environmental support for extracurricular sport and physical activity.
H5. The amount of community and district resources will explain the largest variance in environmental support for extracurricular sport and physical activity, however community social factors will explain a larger degree of variance than school compositional factors.

Participants

The population in this study was public middle schools in North Carolina that offered a regular or magnet program of instruction. Regular programs include an instruction curriculum encompassing all basic subject areas. Magnet programs include all of the areas in a regular program, but feature a thematic programming theme. Magnet programs also allow a minority of students who reside outside of attendance boundaries to attend the school to participate in the magnet program. Not included in this study were North Carolina middle schools that featured special education, vocational education, or alternative education programs. North Carolina has 529 regular public schools encompassing middle grades administered by 115 local school districts (officially known as local education agencies or LEAs). Although the state average is approximately 4.6 middle schools per school district, 30 school districts (26%) contain only one middle school. NCDPI (2004) defines middle schools as follows:

The middle level serves children from ages 11-14 while they are transitioning from childhood into adolescence. The grade configurations in North Carolina that encompass these ages come in many forms. The "typical" middle school contains grades 6-8, but may also be 5-8, K-8, 6-9, 7-12, or any number of other configurations. The overwhelming majority of recently built schools in North Carolina, and nationwide, reflects a "middle school" organization with grade 7 and at least two other grades being housed in the school. The traditional "junior high" familiar to so many is rapidly fading from the scene. Fewer than ten remain in North
Carolina, and several of those will be phased out as new middle schools are built. (p. 5)

While North Carolina’s middle schools reflect a diversity of grade ranges, the dominant organization comprises grades six through eight. Table 3 below represents the grade ranges of all 529 middle schools in North Carolina.

Table 3

<table>
<thead>
<tr>
<th>Grade Range</th>
<th>Number of Schools</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>PK/K-8</td>
<td>74</td>
<td>13.9%</td>
</tr>
<tr>
<td>K-12</td>
<td>6</td>
<td>&lt; 1%</td>
</tr>
<tr>
<td>3-8</td>
<td>1</td>
<td>&lt; 1%</td>
</tr>
<tr>
<td>4-8</td>
<td>5</td>
<td>&lt; 1%</td>
</tr>
<tr>
<td>5-8</td>
<td>23</td>
<td>4.3%</td>
</tr>
<tr>
<td>6-8</td>
<td>381</td>
<td>72%</td>
</tr>
<tr>
<td>6-9</td>
<td>4</td>
<td>&lt; 1%</td>
</tr>
<tr>
<td>6-10</td>
<td>2</td>
<td>&lt; 1%</td>
</tr>
<tr>
<td>6-12</td>
<td>4</td>
<td>&lt; 1%</td>
</tr>
<tr>
<td>7-8</td>
<td>20</td>
<td>3.8%</td>
</tr>
<tr>
<td>7-9</td>
<td>5</td>
<td>&lt; 1%</td>
</tr>
<tr>
<td>7-12</td>
<td>4</td>
<td>&lt; 1%</td>
</tr>
</tbody>
</table>

The two most prominent forms of schools offering middle grades in North Carolina were typical middle schools (Grades 6-8) which comprise nearly 3/4 of the total schools and elementary schools (Grades K-8) which accounted for 14% of all schools. Eleven of the 529 schools (2%) operated on a year-round calendar rather than a traditional ten-month calendar.
For this study, I chose to focus on middle schools because little research has been conducted addressing sport and physical activity opportunities among adolescents in middle grade environments (Hawkins & Mulkey, 2005; McKenzie, 2001). This oversight is particularly troubling considering the increase in sport attrition and increased levels of physical inactivity among middle school-aged adolescents (Petlichkoff, 1996). School-sponsored extracurricular sport and physical activity programs are important environments to increase LTPA among adolescents. However, beyond student enrollment in curricular physical education, little is known about the environments available for middle school students to be physically active outside of school time (Lounsbery et al., 2007). North Carolina represents more than a convenient setting for this study. Based on 2004 data, over 19% of North Carolina’s children were overweight; a figure that ranked fifth in the country (Trust for America's Health, 2008). North Carolina also has the second-highest rural population in the country behind Texas (U.S. Bureau of the Census, 2006).

School-level data were collected through two mechanisms. First, a self-administered web-based questionnaire was distributed to the athletic director at each school. Upon consultation with administrative personnel at individual middle schools and with NCDPI, it was determined that athletic directors were the best school personnel to provide school-level information on extracurricular sport and physical activity (personal communication, K. Ballard, May, 2008; personal communication, E. Domozych, September, 2008; personal communication, M. Mondora, October, 2008). Athletic directors were chosen for several reasons. First, athletic directors have the best access to information related to school
environments related to sport and physical activity programming within a school. Second, these individuals often are more accessible and have more specific knowledge of extracurricular programs than school principals or other administrative personnel (personal communication, M. Lounsbery, April, 2008). Third, while athletic directors are not necessarily the personnel who manage all extracurricular physical activity within a school (i.e., non-competitive physical activity clubs), they are most often faculty within healthful living or physical education departments who oversee the majority of physical activity programming and either supervise or work closely with other faculty engaged in the management of these activities. Fewer than ten middle schools in North Carolina do not have an appointed athletic director. In those cases, a head physical education teacher, principal, or other personnel designated by the school principal to best complete the questionnaire, was chosen.

The second source of data was publicly-available school-level data obtained from NCDPI, NCES, and the U.S. Census Bureau. For the purposes of this study, objective data on each school’s demographics were obtained from NC School Report Cards from NCDPI (http://www.neschoolreportcard.org/src/). Community locale information (i.e., rural-urban classification) was obtained from NCES’s common core of data (http://nces.ed.gov/ccd/). Census data were obtained for community-level social and economic characteristics (http://factfinder.census.gov). Additional community and district data were obtained from the North Carolina Office of State Budget and Management Data Center (http://www.osbm.state.nc.us/nosbm/facts_and_figures/state_data_center.shtm). Family
income and community demographics were acquired from the 2000 decennial census and the 2005-2007 American Community Survey. When available, the later survey was used. However, not all North Carolina communities were included in the American Community Survey.

Procedures

Study Design. This part of the methods chapter will focus on the distribution of and collection of data through the self-administered online questionnaire (Appendix A). Secondary data that were collected for the analysis within this study will be discussed in the measures section. Administrative approval from the North Carolina State Institutional Review Board for Human Subjects was received for this study on November 17, 2008. Participants were compensated $20 for completing the on-line questionnaire and were offered summary reports of the study’s major findings.

The process to distribute a survey to middle school personnel in North Carolina began in March, 2008 with an initial consultation with Kymm Ballard, the physical education, athletics, and sports medicine administrator for NCDPI. Ballard confirmed the importance of this study to NCDPI and their willingness to support the study. The original intent was also for NCDPI to assist with the distribution and contact of school personnel from their database. At two subsequent meetings in November, 2008, Ballard indicated that NCDPI did not have a complete database of the middle school personnel to whom I sought to distribute the questionnaire. She offered to distribute the survey through a voluntary e-mail listserve of school athletic directors. However, Dillman, Smyth, and Christian (2009) stress the
importance of individual contact with potential respondents to increase response rates. Therefore, instead of sending a nonspecific message and link to the questionnaire through this method, I decided to build my own list of school contacts for this study.

The process of collecting contact information for school personnel occurred in two parts. First, on December 4, 2008, NCDPI sent an e-mail message from Kymm Ballard to 71 district-level personnel for whom the department had contact information and who specifically supervised athletics and extracurricular activities for their LEA. These individuals represented 62% of all LEAs/school districts and 76% of the middle schools in the state (Appendix B). The purpose of this e-mail message was to introduce the study, announce NCDPI’s support of the study, and ask for their assistance in providing me contact information for individual school personnel. On December 8, 2008, I sent a follow up e-mail message to this group outlining general information about the study and asking for a list of contacts for personnel who would be responsible for extracurricular sports and physical activity in the middle schools within their LEA’s jurisdiction (Appendix C). Twenty-nine LEAs responded to this request with contact information for 226 schools, representing 41% of the LEAs contacted and 43% of middle schools in North Carolina. Three LEAs required me to submit my request to be reviewed by their research department with all three being approved. In the second step of the contact process, using a list of North Carolina middle schools obtained by NCDPI, I attempted to contact each of the remaining 303 middle schools directly by e-mail messages and phone calls to their principals. Principal contact information was obtained through school and school district websites. The result of these two
components provided me with a final population (n = 437) that represented 83% of all middle schools in North Carolina.

A focus group with four athletic directors from one school district in eastern North Carolina was held on Wednesday, November 26, 2008. The focus group consisted of three male and one female athletic director from four middle schools. Despite being located within a single school district, the four schools represented a diversity of populations and community locales. One purpose of this focus group was to provide recommendations to assist me with the logistics of distributing the online questionnaire. Though I had initially anticipated distribution of the survey in December, 2008, members of the focus group suggested a distribution date of Monday, January 12, 2009. The consensus among focus group participants was that sending a survey to school personnel would create two negative issues for the study based upon the proximity of winter break for schools. First, they suggested that because of the numerous distractions immediately before this break (e.g., mid-term exams and reporting requirements), school personnel would be less likely to complete survey at that time. Second, because many school personnel may feel overwhelmed or simply “have one foot out of the door” (‘Leona’ - focus group participant) in December, those individuals who chose to complete the questionnaire may not give it their full attention. The January 12 deadline would be preferable because it would fall after school returned to session following break and personnel were more “excited and energetic” (‘Steve’ - focus group participant). The date was also suggested because, out of respect for their school-related duties upon returning from break, it would give personnel a full week back at school.
before completing the questionnaire. The suggested $20 compensation for respondents was agreed to be sufficient to encourage school personnel to complete the questionnaire. The focus group participants also suggested including a cut-off date of January 31 to encourage personnel not to put off completing the survey.

On December 18, 2008 e-mail messages were sent to all 437 middle schools alerting potential respondents of the upcoming questionnaire (Appendix D). As recommended by Dillman, Smyth and Christian (2009), each e-mail was sent individually and was personalized for each recipient. A follow-up reminder was sent by e-mail on Monday, January 5, 2009 – one week from the date the on-line questionnaire would be accessible that also included some basic information to prepare participants for the questionnaire (Appendix E). On January 12, 2009, e-mail messages were sent to the 437 middle schools with instructions for accessing the on-line questionnaire (Appendix F).

The questionnaire was created in Survey Monkey and made available via web link to the surveymonkey.com website. However, because focus group participants who had provided feedback on the draft questionnaire indicated having problems with the long web address provided by Survey Monkey, I also used a link through tinyurl.com (www.tinyurl.com/ncstatestudy) to provide an alternate address that was easier to remember and type into a web browser. Because e-mail-based contact is sometimes unreliable due to its more impersonal nature and the frequent use of e-mail spam filtering software, an additional method of contact is recommended (Dillman et al., 2009). Therefore, on January 12, postcards printed with information about the study and the web addresses for the
questionnaire were mailed to all 437 middle schools (Appendix G). Finally, on January 26, 2009, reminder e-mail messages were sent to 174 middle school personnel who had yet to complete the questionnaire (Appendix H). Respondents were able to leave the questionnaire and return later to complete it, however, the average completion time was approximately 17 minutes. The final response rate for this study was over 75.7% based upon 331 usable completed questionnaires. The completed questionnaires represent 62.5% of all North Carolina middle schools. Although I had hoped to acquire information from a larger selection of middle schools across the state, the response rate is similar to those of similar studies (S. M. Lee, Burgeson, Fulton, & Spain, 2007; Lounsbury et al., 2007). A map highlighting the schools participating in this study is presented as Figure 4 below.
Non-response analyses. I approached analyses of non-respondents in two ways.

First, I compared schools for which a valid contact could be located (n = 437) and those for which appropriate personnel could not be located or were otherwise excluded from the study population (i.e., LEA or principal declined to participate) (n = 92). Second, from the sample of 437 schools who received access to the on-line questionnaire, I wanted to compare key characteristics of schools whose personnel responded and those whose personnel did not.

The initial comparison of schools that were successfully contacted (Contact) and those who were not (Non-Contact) revealed some differences between the two groups. Statistically significant results of $\chi^2$ tests indicated that rural schools and extended elementary schools, those comprising grades kindergarten through eighth grade had a lower representation among the Contact group than the Non-Contact group. The mean percent of minority composition in the Contact group was 41.7% compared to 49.9% in the Non-
Contact group. The mean percent of economically disadvantaged in the Contact group was 47.6% compared to 55.9% in the Non-Contact group. Mean differences were statistically significant at the .05 alpha level, indicating that high-minority schools and poorer schools were less likely to be successfully contacted.

The differences in minority and disadvantaged populations between the two groups can partially be explained by 11 LEAs, representing 38 schools, that either declined to participate at the district level or whose communication system or policies prevented my contacting school personnel. There were three types of scenarios that ruled out further contact with schools from a particular LEA. Two LEAs declined to participate in the study. One provided no explanation while the other cited that they did not want their personnel being bothered with outside distractions. Three LEAs granted permission for me to contact their school personnel directly, but I became blocked by their system-wide e-mail server as unsolicited bulk e-mail. Thus, I was no longer able to communicate electronically with any of the school contacts or the LEAs’ central offices. While this issue surfaced with other LEAs during this process, I was never able to successfully make contact via e-mail or telephone with any district or school personnel in these four LEAs. Finally, with six LEAs, I was never able to establish initial contact with an appropriate representative at the district-level or school-level. These ten LEAs represent a high concentration of poor minority populations (both African American and American Indian). After taking these schools out of the comparative analysis, mean differences for percent minority and percent economically disadvantaged between Contact and Non-Contact groups were no longer statistically
significant. Because these 11 LEAs were evenly dispersed geographically (3 in the Northeast, 2 in the Southeast, 3 in the Piedmont, and 3 in the Mountains) and adjacent LEAs were successfully contacted, the absence of these schools were not expected to lead to substantial sample bias. However, the differences in the two groups should be noted.

With respect to the differences between Contact and Non-Contact groups on community type, it would be expected that more rural locations would have less reliable communication systems (Dillman, 1991). Therefore, it was not surprising that contacting rural schools was more difficult than contacting schools in less rural parts of the state. However, the ratio of schools by community type that were successfully contacted to participate is largely representative of the middle schools within the state and is not expected to lead to sample bias. A graphical representation of this comparison is shown in Table 4.
Table 4

Cross-tabulation of Community Type and Contact Type

<table>
<thead>
<tr>
<th>Community Type</th>
<th>Contact Count (Pct. Of Group)</th>
<th>Non-Contact Count (Pct. Of Group)</th>
<th>State Total Count (Pct. Of Group)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural</td>
<td>117 (26.8%)</td>
<td>46 (50.0%)</td>
<td>163 (30.8%)</td>
</tr>
<tr>
<td>Rural Fringe</td>
<td>112 (25.6%)</td>
<td>21 (22.8%)</td>
<td>133 (25.1%)</td>
</tr>
<tr>
<td>Town</td>
<td>56 (12.8%)</td>
<td>14 (15.2%)</td>
<td>70 (13.2%)</td>
</tr>
<tr>
<td>Suburban</td>
<td>61 (14.0%)</td>
<td>5 (5.4%)</td>
<td>66 (12.5%)</td>
</tr>
<tr>
<td>City</td>
<td>91 (20.8%)</td>
<td>6 (6.5%)</td>
<td>97 (18.3%)</td>
</tr>
</tbody>
</table>

Note. Pearson $\chi^2 = 26.779$ (df = 4), $p < .001$

For the purposes of this study NCES locale classifications were collapsed. Rural distant and rural remote were collapsed into a separate rural classification from rural fringe. In later analyses, I further collapsed categories by re-categorizing Town distant and remote into Rural and Town fringe and Rural Fringe into Rural Fringe. The rationale for this is explained later in this section.

In the second component of this analysis, I explored differences between respondents and non-respondents in the traditional sense to identify any indicators of non-response bias. Pearson $\chi^2$ coefficients for community type ($\chi^2 = 6.173$, $p = .187$) and school type ($\chi^2 = 2.413$, $p = .790$) were not statistically significant. Similarly, no significant mean differences were found between respondents and non-respondents in terms of percentage of minority or economically disadvantaged school population. In general, no non-response bias appears evident in the second stage of this analysis.
To acquire school-level data of physical activity environments, a web-based questionnaire was adapted from the School Health Policies and Program Study 2006 (SHPSS): School-Level Questionnaire Modules 1 (Standards, guidelines, and objectives; required physical education; instructional content; student assessment; use of protective gear; physical activity and discipline; students with disabilities; facilities; staffing and staff development; collaboration and promotion; intramural activities and physical activity clubs; community use of school facilities; and physical education coordinator) and 2 (interscholastic sports). Administered by the Division of Adolescent and School Health (DASH), National Center for Chronic Disease Prevention and Health Promotion, and CDC, SHPPS is the primary source of data on school health programs and policies in the U.S (Kyle et al., 2007). Questionnaire modules have been created to collect state-level, district-level, school-level, and classroom-level data. The questionnaire modules were first developed in 1994 with revisions in 2000 and 2006. SHPPS questionnaire modules have been administered as live phone interviews, self-administered paper questionnaires, and computer-assisted phone interviews and are currently being adapted for web-based administration (Kyle et al.).

Questions on the SHPPS modules used in this study were developed through literature reviews, expert panel meetings, and formal field tests (Kyle et al., 2007). In past years, SHPPS school-level modules have demonstrated moderate to high reliability and validity (Brener, Kann, & Smith, 2003). The largest threats to reliability and validity in SHPPS, in terms of low Kappa values, have occurred with questions that require more
subjective responses, such as determining whether schools have met abstract goals (Brener et al.). These types of questions were not included in the current study. Overall, SHPPS questions are expected to yield valid data on school programs and environments. The full SHPPS 2006 modules used to create the instrument used in this study can be accessed at http://www.cdc.gov/healthyyouth/shpps/2006/questionnaires/index.htm.

An initial draft of the questionnaire was taken directly from SHPPS. Based upon IRB requirements, informed consent language was added to the introduction information of the survey. The wording of some questions was changed to simplify language, reduce the number of words, and create a better visual presentation for respondents (Dillman et al., 2009). Additionally, many of the categorical questions asked by the SHPPS modules are “check all that apply” questions, and considering these type questions often produce low question-level responses (Dillman et al.), these were changed to forced response. Because the SHPPS modules have yet to be fully adapted for a web-based environment, alterations were required to fit the limitations of the software program. Additionally, based upon recommendations from Dillman et al. for adapting survey instruments to web-based environments, I also: added question logic to group similar questions together and lower unintended question sequences, created a consistent visual presentation of questions and pages, tested the questionnaire on multiple web browsers and user settings, and minimized the number of questions that required an answer.

Based upon the review of literature and best practice recommendations from professional agencies, five question components were added to the existing SHPPS
questions. Three of these questions sought to document practices related to supportive
environments that were not part of the SHPPS module (‘no cut’ policies that eliminate
tryouts and cuts from interscholastic teams, organization of multiple interscholastic teams
based upon age or skill level to accommodate more students, and programs of adaptive
physical activities for students with disabilities). One question component sought to
document the number of volunteers (i.e., parents, community members, booster club
members) who are available to assist with the organization of extracurricular sports and
physical activities.

Following the development of the draft instrument, copies of the questionnaire were
sent to experts for review. Per recommendation by Dillman et al. (2009), these experts
included individuals familiar with the creation and distribution of surveys, school practices
and policies, and those familiar with content areas included in the questionnaire. These
experts included four faculty members at North Carolina State University, two administrators
(assistant principals) at two local middle schools, a representative from NCDPI, and three
former middle school physical educators and athletic directors now employed either at the
state or district administrative level. I received verbal and written feedback from all
reviewers.

Based upon the expert feedback, I made several changes to the questionnaire. I
further clarified definitions for ‘interscholastic sports’ and ‘intramural sports’ to eliminate
some existing perceived overlap between these terms. I removed some redundant questions
that served only to document existing required state policy. For example, an early question
asked about the grade levels eligible to participate in a school’s interscholastic sports program (6th, 7th, or 8th). Since only seventh and eighth graders are permitted by state policy to participate in these activities, this question was deemed unnecessary. To simplify the questionnaire experience for respondents, components were separated for interscholastic sport and other extracurricular physical activity programs. Therefore, only personnel whose schools offered those types of programs answered related questions. Questions asking respondents to document the specific sports and programs available at their school were rearranged from the alphabetical listing in SHPPS. Activities that were expected to be the most popular were moved to the top of the listings to reduce the likelihood of respondents skipping the question. Questions to further document partnerships between schools and other community organizations were added. Ordinal response questions about estimates of paid staff and volunteers were changed to a direct entry format. Finally, the language of several questions was further simplified and clarified to reduce confusion.

In the second step of instrument development, I conducted a pilot study and focus group with four middle school athletic directors on November 26, 2008. All four members of the focus group were sent an internet address for the web-based draft of the questionnaire a day prior to the focus group. They were instructed to complete the questionnaire and document their thoughts to discuss at the focus group. Each participant was compensated $25 and provided with lunch. Overall, members of the focus group indicated their satisfaction with the ease of navigation for the on-line questionnaire and demonstrated full understanding of the questions. Some additional language was changed for one question to
better clarify its meaning based upon comments from one focus group participant. One alteration was to a SHPPS item asking about required participation fees for interscholastic sports and extracurricular physical activities.

The focus group participants suggested expanding the scope of this question to include all financial costs required for participation, including uniforms, equipment, camp attendance, and travel. The focus group participants also suggested an additional way to document available human resources for implementing extracurricular physical activity programs. They argued that schools who offer the most supportive environments for LTPA would likely have personnel focused on these activities rather than attempting to split time between organizing extracurricular activities and teaching full-time. A component was developed to explore this suggestion. Finally, a component was developed to document perceived organizational constraints to adding intramurals and non-competitive physical activity programming. Respondents were only asked to complete this section if they did not offer these programs in their school. Though not intended to be used for specific analyses in the current study, this component may add some context for the findings of this study.

The key finding from the focus group was that participants suggested I include requests for additional information about school interscholastic sports to accurately document the availability of these programs to students. Three characteristics of middle school sports programs that, for the most part, have previously been undocumented may create increased or decreased opportunities for students to participate. First, multiple schools within the same community may combine to organize shared teams in some sports, limiting the available
team roster positions by 1/2 or 2/3 for students in a school in comparison to similarly sized schools with their own program. Second, many middle schools offer some interscholastic sport activities in the form of ‘club sports,’ which like physical activity clubs can allow schools to offer broader sport programs. Unlike physical activity clubs, which are often less structured and non-competitive, these clubs take on all indicators of interscholastic sports teams. However, the notable exception between club sports teams and those sponsored by the school is that the financial costs of participating in these activities are usually borne exclusively by the participants and are not subsidized by school funds. In effect, club sports are more privatized version of school sports. Finally, it was revealed that in addition to some schools providing multiple skill-based interscholastic sports teams, a few schools may organize multiple teams for popular sports (i.e., football, boys’ basketball, and soccer) based upon grade level to accommodate more interested students. Components were added and questions modified to reflect these suggestions from the focus group participants.

Following the focus group and making the modifications listed above, I sent a final draft of the questionnaire to the focus group participants and selected members of the panel of experts. A few final revisions were made to the questionnaire based on this review. The final version of the instrument is provided as Appendix A. Participants in the pilot study were subsequently asked to complete the questionnaire a second time along with the general study sample, but their data were not included for analysis. In the following section, I summarize the measures acquired through the web-based questionnaire and from secondary data sources that were used in this study.
Measures

The dependent variable throughout the study was environmental support for LTPA, operationalized both compositionally and in its separate component parts. Explanatory measures were community type, school composition, community contextual resources, and community collective factors. Table 5 shows in brief all variables used in this study.
Table 5

*Study Variables*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DEPENDENT VARIABLES</strong></td>
<td></td>
</tr>
<tr>
<td>Interscholastic sports program</td>
<td>Number of interscholastic sport activities offered at the school</td>
</tr>
<tr>
<td>Intramural sports program</td>
<td>Number of intramural sport activities offered at the school</td>
</tr>
<tr>
<td>Physical activity clubs</td>
<td>Number of physical activity clubs offered at the school</td>
</tr>
<tr>
<td>Open gym or free play to students</td>
<td>Whether the school offered open gym or free play to students</td>
</tr>
<tr>
<td>Indoor facilities</td>
<td>Number of indoor facilities for extracurricular physical activities</td>
</tr>
<tr>
<td>Outdoor facilities</td>
<td>Number of outdoor facilities for extracurricular physical activities</td>
</tr>
<tr>
<td>Special transportation</td>
<td>Late activity bus available for some activities</td>
</tr>
<tr>
<td>Programs for students with disabilities</td>
<td>Extracurricular programs available for students with disabilities</td>
</tr>
<tr>
<td>Community use of facilities</td>
<td>School facilities open for use to community groups and members</td>
</tr>
<tr>
<td>Community partnerships</td>
<td>Collaborates with community groups to organize LTPA program</td>
</tr>
<tr>
<td><strong>EXPLANATORY VARIABLES</strong></td>
<td></td>
</tr>
<tr>
<td>Community Type</td>
<td>Whether school was located in rural, suburban, or urban community</td>
</tr>
<tr>
<td>School Size</td>
<td>School enrollment for middle school grades 6, 7, and 8</td>
</tr>
<tr>
<td>Percent Minority</td>
<td>Percent of student body that identified as a racial/ethnic minority</td>
</tr>
<tr>
<td>Percent Economically Disadvantaged</td>
<td>Percent of student body receiving free or reduced lunch</td>
</tr>
<tr>
<td>Elementary School</td>
<td>Whether the school was an elementary school (grades K-8)</td>
</tr>
<tr>
<td>Local Per Pupil Expenditure</td>
<td>District per pupil expenditure from local revenue sources</td>
</tr>
<tr>
<td>Median household income</td>
<td>Median household income in approximate school attendance area</td>
</tr>
<tr>
<td>Income inequality</td>
<td>Index of income inequality in school district (Gini coefficient)</td>
</tr>
<tr>
<td>Racial heterogeneity</td>
<td>Index of racial and ethnic diversity in school district (Theil’s H)</td>
</tr>
<tr>
<td>Education Level</td>
<td>Percent of population in school attendance area with a bachelor’s degree</td>
</tr>
<tr>
<td>Commute Time</td>
<td>County mean commute time to work</td>
</tr>
<tr>
<td>High School Football Success</td>
<td>Number of appearances of parent high school in regional football championship game</td>
</tr>
<tr>
<td>High School Basketball Success</td>
<td>Number of appearances of parent high school in regional football championship game</td>
</tr>
</tbody>
</table>

Note: Items included in dependent variable will be indexed into a composite variable.
Dependent variables. Supportive environments for LTPA reduce individual constraints and encourage participation while less supportive environments may prevent participation even when individuals are motivated (Elder et al., 2007; O'Donnell, 2005; Thompson et al., 2005). Supportive environments make it easy for individuals to be physically active (Estabrooks et al., 2008; Stokols et al., 2003). Overall, creating or enhancing places and programs for physical activity can increase the number of people who participate in LTPA (Floyd, Spengler et al., 2008). Since 2000, the CDC and the U.S. Department of Education have been issuing guidelines and strategies to promote physical activity in schools (Young et al., 2007). In relation to LTPA in school settings, and based on the policy goals stated by these groups, several characteristics of supportive environments have been identified. Schools should have an adequate number and variety of safe facilities (Wechsler et al., 2000). It is also recommended that schools offer a broad variety of programs that have the potential to appeal to a wide range of adolescents (e.g., interscholastic sports, intramural sports, physical activity clubs, and free play) (Centers for Disease Control and Prevention, 1997; Floyd, Bocarro et al., 2008; Leppke & Tenoschok, 2003; Lounsbery et al., 2007; National Association for Sport and Physical Education, 2002; Tompkins et al., 2004; Wechsler et al., 2000; Young et al.). Inclusive school policies (e.g., late activity buses and adaptive programs for students with disabilities) are important to reduce specific individual constraints to participation (Canadian Association for Health, 2005; Jago & Baranowski, 2004; Sallis et al., 1998; Young et al., 2007). Finally, linkages between school and community (e.g., access to school facilities for community use and partnerships with
community organizations) can create an environment of physical activity promotion that encourages participation (Centers for Disease Control and Prevention; McKenzie; National Association for Sport and Physical Education; Tompkins et al.; Wechsler et al.).

Little information is available in the research literature or from government agencies that attempts to investigate the extent to which schools are implementing the recommendations to improve environmental supports for LTPA in schools (Young et al., 2007). Additionally, few researchers have attempted to explore the community context and social conditions that are associated with increased or decreased levels of school environmental support for extracurricular physical activity. The next section describes how I operationalized measures of programs, facilities, inclusive policies, and community linkage.

Programs. A key indicator of a supportive environment for LTPA in school environments is the presence of broad extracurricular physical activity programs (including interscholastic sports, intramural sports, non-competitive physical activities, and free play) that has the potential to appeal to a wide range of students (Bocarro et al., 2006; Centers for Disease Control and Prevention, 1997; Floyd, Bocarro et al., 2008; K. Green et al., 2005; Leppke & Tenoschok, 2003; Lobstein et al., 2004; Lounsbery et al., 2007; National Association for Sport and Physical Education, 2002; Tompkins et al., 2004; Wechsler et al., 2000; World Health Organization, 2003; Young et al., 2007). For the purposes of this study, interscholastic sport refers to programs that provide competitive sports between different schools, whether varsity or club status (McKenzie, 2001). Intramural sport refers to programs that provide competitive sports within the school whether or not scores and
standings are kept (McKenzie). Physical activity clubs refer to non-competitive student physical activity groups that meet periodically (McKenzie). Consistent with the literature, I measured the breadth of extracurricular physical activity programming in two ways on the web-based questionnaire. First, respondents were asked whether their school offered interscholastic sports, if their school offered intramural sports and/or physical activity clubs, and if their school offered “open gym” or “free play” to students outside of school hours.

Though commonly used as variables to measure extracurricular programs as components of supportive school environments, this approach is limited. Since it provides no accounting of the number of activities offered, there is no way to compare schools on the degree of opportunities provided to students. For example, a school offering one intramural activity and another school offering ten intramural activities are both measured with the same value. Therefore, respondents were asked to indicate whether their school offered specific sports or activities. Respondents were asked to choose “not available,” “girls team only,” “boys team only,” “separate boys and girls teams,” or “team for both boys and girls (co-ed)” for 25 potential interscholastic sports (See Appendix A for full listing). For respondents who indicated their schools offered intramural sports or physical activity clubs were also asked to choose in a similar format from 19 specific intramural sports and 19 non-competitive physical activities offered at their school. In both components, respondents also had the opportunity to write in any activities not listed that were offered at their school.

I measured the number of activities offered in each program at each school in aggregated form. For interscholastic sports, each team the school offered was recorded as 1.
Therefore, a school that offered separate boys’ and girls’ basketball teams and a co-ed golf team would receive a score of 3. Similar aggregation was performed on intramurals and physical activity clubs. Separate activity calculations were made for interscholastic sports, intramural sports, and physical activity clubs in order to prevent flawed results based on schools who offer a large number of interscholastic sports, but no intramurals or physical activity clubs. The availability of “open gym” or “free play” remained in its original form as an indicator variable.

**Facilities.** Wechsler et al. (2000) suggested that supportive school environments for LTPA include access to adequate facilities for sport and physical activity. There is substantial evidence of a positive relationship between access to built environments for physical activity and increased rates of LTPA among adolescents (Centers for Disease Control and Prevention, 1997; Estabrooks et al., 2003; Sallis et al., 2000; W. C. Taylor et al., 2006). However, the relationship between the amount of available facilities and physical activity may be small (Kaczynski & Henderson, 2007). In school environments, school physical activity programming and personnel may play a more significant role than facilities in encouraging LTPA (Cohen et al., 2008). Therefore, facilities should only be considered within the context of a multi-dimensional approach to supportive environments (Wechsler et al.). Wechsler et al. argued that no agreement exists in defining an adequate number or ideal types of facilities. However, a variety of types of facilities is expected to increase the opportunities adolescents have to be physically active at school (Wechsler et al.).
To measure available facilities for extracurricular sport and physical activity, respondents were asked to document the availability of and quantity of nine specific indoor facilities and 12 specific outdoor facilities (See Appendix A). Facilities were defined as “the places your school uses for extracurricular physical activities, including interscholastic sports, intramural sports, and non-competitive physical activities.” In both sections, respondents could write in any additional facilities at their school that were not listed. The measurement of school facilities was limited to facilities that were located on school property. Because outdoor facilities and indoor facilities are expected to influence LTPA differently (McKenzie, 2001; Sallis et al., 2000), separate measures for indoor and outdoor facilities were calculated. Although this approach seemingly provides only an inventory of facilities (i.e., quantity), it also provides an adequate measure of variety of facilities because it was expected that middle schools would have few duplicate facilities.

Inclusive policies. To make it easy for adolescents to participate in LTPA, supportive school environments should feature inclusive policies to reduce structural barriers for participation (Jago & Baranowski, 2004; Sallis et al., 1998; Wechsler et al., 2000; Young et al., 2007). Recommendations for inclusive practices in extracurricular school program have often been general in nature. However, the most commonly cited barrier to participation faced by adolescents, especially those from disadvantaged backgrounds, is a lack of transportation between school and home. With longer commuting distances for parents and school consolidation plans that have increasingly led to larger school attendance zones, middle school students are more reliant on school-provided transportation systems, especially
in rural areas (Tigges & Fuguitt, 2003; Tompkins et al., 2004). To maximize efficiencies, school busses typically arrive immediately before school and depart immediately after school. To participate in typical extracurricular after-school activities, students are required to provide their own transportation from school. Therefore, it is recommended that schools provide a late activity bus that can provide special transportation home to students who wish to stay after school to participate in extracurricular activities (McMeeking & Purkayastha, 1995; Wechsler et al., 2000; Young et al., 2007). Two items were included in the web-based questionnaire to determine the availability of this type of transportation for both interscholastic sports and, if applicable, intramurals and physical activity clubs. These questions asked, “Does your school provide special transportation (e.g., an activity bus) to school or home for students who participate in [intramurals or physical activity clubs/interscholastic sports]?” Respondents could choose “No,” “Yes, for some activities,” or “Yes, for all activities.”

Another area in which students may be excluded from participating in school extracurricular sport and physical activity that has largely been overlooked in the research is based on the presence of physical or mental disabilities. State policy in North Carolina requires schools to provide inclusive opportunities for students with mental and physical disabilities to participate in extracurricular activities, including physical activities (Public Schools of North Carolina, 2007). Physical Education and Health Canada and NAPSE also recommend the inclusion of adaptive physical activity programs to accommodate students with mental and physical disabilities in school environments. The provision of opportunities
may be particularly important for students with disabilities in rural areas, where programs in
the public and private sector are likely less frequently available. In the web-based
questionnaire, respondents were asked, “Does your school have any extracurricular programs
for sport and/or physical activities for students with special needs?” Respondents could
choose “No,” “Yes, organized by the school,” or “Yes, through an outside agency or
organization.” The original draft of the questionnaire included an item that asked
respondents more directly about the inclusion of students with disabilities in their
extracurricular programs. Upon the request of N.C. State’s IRB, I explored the potential
sensitivity of the question in relation to state policy for the inclusion of students with
disabilities. Members of the focus group indicated that few schools and school personnel are
able to include this population of students in existing programs, though admitting to this
practice in the questionnaire would indeed acknowledge that their school was in violation of
official state policy. Therefore, this question was changed in the final version of the
questionnaire.

Community access and collaboration. To increase environmental support for
extracurricular physical activity, schools should cooperate with individuals and organizations
within their larger community (Centers for Disease Control and Prevention, 1997; McKenzie,
2001; National Association for Sport and Physical Education, 2002; Tompkins et al., 2004;
Wechsler et al., 2000). This process occurs in two ways: providing access to school facilities
for structured and unstructured community-sponsored physical activity programs and through
collaborative partnerships with community organizations to provide physical activity programming.

The CDC (1997) recommend that schools provide children access to their physical activity facilities outside of the school hours, on weekends, and during school vacations. Researchers have linked the availability of school facilities for use by adolescents within the community, as part of the community’s overall resources for physical activity, and lower rates of obesity (M. M. Scott et al., 2007). Because community organizations may be limited in their access to facilities to provide physical activity programming (Churchill et al., 2007; Paluck et al., 2006; Patterson et al., 2004; Sanderson et al., 2003), the availability of school facilities for these groups may enhance the overall provision of facilities across the community. Therefore, community access to school facilities was included as a measure of environmental support for extracurricular school physical activity. Four questions were asked on the web-based questionnaire to measure the availability of school facilities to the community. Participants were asked if outside of school hours or when school is not in session, whether children or adolescents use any of their school’s physical activity or athletic facilities for 1) community sponsored sports teams, 2) community-sponsored classes or lessons (e.g., tennis or dance), 3) community-sponsored supervised free play, or 4) unsupervised free play.

Another important way in which linkages between schools and communities can enhance environmental support for physical activity is through collaborative partnerships. One specific recommendation from the CDC (1997) is to “link students to community
physical activity programs, and use community resources to support extracurricular physical activity programs” (p. 17). By partnering with community organizations, they argue students will be more likely to take advantage of community-based resources outside of school programs. Additionally, the CDC suggest that often “schools have the facilities but lack the personnel to deliver extracurricular physical activity programs. Community resources can expand existing school programs by providing intramural and club activities on school grounds” (p. 18). Participants were asked if, over the course of a school year, their school would work with 11 different community organizations included in the SHPPS module (e.g., local health department, parks and recreation department, or youth organization: see Appendix A for a full listing) to organize extracurricular sports or physical activities. Participants could respond “Yes,” “No,” or “Community doesn’t have.” Community partnership was measured by individual organization, whether the school had collaborated with any community organization, and as the percentage of organizations available in the community with which the school had partnered.

*School composite supportive environment index.* Only one study was found that attempted to combine individual school-level policies and practices to obtain a single measure of a school’s environmental support for physical activity (Young et al., 2007). Young and her colleagues used a 10-item scale to account for all physical activity environmental supports within a school. However, because of the complexities of the different physical activity opportunities available throughout the school day (i.e., curricular physical education, active transportation to and from school, extracurricular programs, and
recess) their index may be too limited to capture nuanced variation between schools in specific policy areas. Additionally, their index gives disproportional attention to curricular physical activity in relation to extracurricular physical activity, potentially skewing the measurement of extracurricular programs in the context of the overall school environments. Rather than replicating this work, I attempted to expand upon their limited measurement of environmental support of extracurricular physical activity. Because index items are additive (S. D. Searle, Mitnitski, Gahbauer, Gill, & Rockwood, 2008; Young et al.), improved measures of individual components of supportive school environments can be combined to provide a better understanding of all school-level programs and environments in future studies.

Indices are used to aggregate multi-dimensional indicators of environmental characteristics into a single numerical measure (Ebert & Welsch, 2004; Ott, 1978). Unlike thematic scales where correlated items are comprised to measure the underlying structure of a latent variable, environmental indices often aggregate “incommensurable variables” to allow comparisons of overall environmental states (Ebert & Welsch, p. 271). This process allows for a comparison of composite environmental conditions across time or space (Ebert & Welsch). An index can include an aggregation of items measured as ratio, interval, ordinal, or binary variables (S. D. Searle et al., 2008). However, to eliminate biases created by measurement in different units, variables must be normalized and standardized prior to their inclusion in the index (Ebert & Welsch). All items within the index are standardized within a range of 0 to 1 and aggregated to reach a single composite score. Binary variables
are relatively simple to code for indexing purposes. Ordinal variables sometimes offer natural cut-points to rescale from 0 to 1. For example a 5-point Likert-type scale can be re-coded as 0, .2, .4, .6, .8, and 1 (S. D. Searle et al.). Interval data is generally normalized and standardized by a formula of $I(X_{i})_{j} = [X_{ij} – \text{Min.}(X_{i})]/[\text{Max}(X_{i}) – \text{Min}(X_{i})]$ where $I(X_{i})_{j}$ is the index value of site $j$ based on the un-standardized score ($X_{i}$) of site $j$ in relation to the extreme ranges of each characteristic in the population (Min. and Max.) (Ebert & Welsch; Naber, 2008).

In their index, Young et al. (2007) took three approaches to normalizing and standardizing individual measures of environmental support. In many of their physical education categories they applied the standard of an attribute being maximally present (e.g., all physical education instructors are certified as physical education specialists). Conversely, in their measures of supports for extracurricular physical activity, they applied a standard of attributes being minimally present (e.g., interscholastic sports program is available, late bus runs once per week). Finally, for facilities, they applied a 0 or 1 score for the subjectively determined adequacy of facilities based upon reports from school personnel. Ebert and Welsch (2004) suggest that, when possible, the “widest class of meaningful indices is obtained” when input data are ratio (p. 282). Therefore, when applicable, I attempted to improve upon the index used by Young et al., by included comparable ratio-scaled data. The 10 index variables used in this study are defined in Table 6.
### Table 6

**Composite Environmental Support Index Variables**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Availability of interscholastic sports</td>
<td>Adjusted number of interscholastic sports activities normalized and standardized to a range of 0 to 1</td>
</tr>
<tr>
<td>Availability of intramural sports</td>
<td>Number of intramural sports offered normalized and standardized to a range of 0 to 1</td>
</tr>
<tr>
<td>Availability of physical activity clubs</td>
<td>Number of physical activity clubs offered normalized and standardized to a range of 0 to 1</td>
</tr>
<tr>
<td>Availability of open gym or free play to students</td>
<td>Yes = 1, No = 0</td>
</tr>
<tr>
<td>Indoor facilities</td>
<td>Number of indoor facilities for extracurricular sports and physical activity normalized and standardized to a range of 0 to 1</td>
</tr>
<tr>
<td>Outdoor facilities</td>
<td>Number of outdoor facilities for extracurricular sports and physical activity normalized and standardized to a range of 0 to 1</td>
</tr>
<tr>
<td>Availability of special transportation</td>
<td>Late activity bus available for some activities = 1; No late activity bus available for any activities = 0</td>
</tr>
<tr>
<td>Availability of programs for students with disabilities</td>
<td>Yes = 1, No = 0</td>
</tr>
<tr>
<td>Community use of facilities</td>
<td>Available for sports and other physical activities = 1, Available only for sports teams = .5, Not available for community use = 0</td>
</tr>
<tr>
<td>Community partnerships</td>
<td>At least one collaborative partnership = 1, No collaborative partnerships = 0</td>
</tr>
</tbody>
</table>
The environmental support index was created to use ratio data when available. However, because no accepted target values have been suggested within the literature or policy recommendations, cut-points were not used to minimize subjectivity. Similarly, for most binary and ordinal variables, a standard of minimally available attributes was applied to reduce the use of artificially created or subjective ideal targets. Only one measure included a median cut-point (i.e., community access to facilities) based upon recommendations for broad community access. Therefore, for this measure, I assumed that although schools could increase accessibility by allowing the use of facilities by sports teams, full accessibility to facilities could not be limited solely to community sports teams. The ten measures of environmental supports for school extracurricular physical activity were aggregated to provide a single composite score to measure each school’s level of environmental support.

In some indices, the aggregation of variables within an index would be expressed in relation to an external target value and variables weighted based upon known scientific relationships between items in the index. This practice is problematic in many frameworks where a priori relationships among variables are not known (Ebert & Welsch, 2004; S. D. Searle et al., 2008). When no objective measure is available to determine the relative importance of different indicators in relation to the overall value an index, one approach is to use equal weights for items. Often, according to Esty, Levy, Srebotnjak, and de Sherbinin (2005), “As unsatisfactory as the choice of equal weights may appear, it is a neutral and justifiable allocation of importance across the indicators” (p. 66). However, the use of equal weights assumes that each component contributes equally to the variance in the index across
the population. For the index of composite environmental support for extracurricular sport and physical activity, some components are expected to be more important than others in determining variance between schools. Because relatively little is known about the relationship between indicators of environmental support, a statistical weighting system was used. Least squares estimation and principal components analysis are the two most common ways to statistically estimate the relative weights of index items (Esty et al.). For this study, I chose to use a principal components analysis (PCA) of the indicators to account for the relative importance of individual items within the scale (Esty et al.).

PCA uses a linear combination of all scale items to create a smaller number of dimensions that best explain variance within the data. Through this process, PCA analyzes the correlation matrix including all items and produces factors that reflect the common variance of variables (Dunteman, 1989). The combination of these factors accounts for the total variance in the index explained by the measured components. Because of the small number of indicators in the environmental support index, using PCA for data reduction purposes is not appropriate; however, the index is expected to yield components along its measured dimensions (i.e., programs, facilities, policies, and community partnerships). The primary purpose of PCA in this study is to assign relative weights to index components. The appropriate number of components for dimensions of the index was determined through examination of Eigenvalues and the scree plot. Using a Varimax rotated loading matrix, factor loadings were squared to avoid negative weights and summed for each index item across all components (Esty et al., 2005). Weights were then re-scaled to reflect their
proportion to the maximum index score of 10. The next section will describe the explanatory variables I used in this study to explore disparities in access to supportive environments.

Explanatory variables. The goal of this research was to determine whether disparities existed in access to supportive environments for extracurricular school sport and physical activity based upon locale. Therefore, the key independent variable in this study was community type. I further sought to explore to what degree any geographic disparities in access to supportive environments were explained by school composition, community economic resources, and collective social functioning. Therefore, these variables served as covariates in this study.

Community Type. Community type was measured as the school’s location in a rural, suburban, or urban community. Children and adolescents who live in rural areas of the U.S. may experience increased risk for overweight and obesity (Harrell et al., 2005; M. C. Nelson et al., 2006). A contributing factor to this heightened risk may be that rural communities have relatively fewer supportive environments for LTPA than suburban and urban areas (Churchill et al., 2007; Paluck et al., 2006; Patterson et al., 2004; Sanderson et al., 2003). To explore this hypothesis, I compared the level of environmental support for extracurricular sport and physical activity among rural, suburban, and urban schools in North Carolina.

Though differences between rural and urban populations remain a widely-used concept in different academic disciplines, there is very little agreement over the definition of rural (Brown & Swanson, 2003; Miller & Bates, 1987). The consensus among many Americans is that “[we can] tell a place is rural when we see it” (Wimberley, 1997, ¶ 1), but
it becomes more difficult to operationalize the concept of rural in empirical research. Defining rural (or the categorization of any geographic place) recognizes that social fields develop as individuals meet their physical, mental, and emotional needs through systems of social relations. Wilkinson (1991) contends that this process of social interaction among people living in a shared geographic environment is the foundation for collective culture and identity for localities. Despite evidence that social life has become more globalized and fragmented, the participation of individuals in networks of interaction within localized space sustains the relevance of community in contemporary society (Luloff & Bridger, 2003). For residents of rural areas, these interactions may be different from those living in urban areas (Wimberley, 1997).

Often rurality remains associated with low population size and density and contrasted to urban settings (i.e., cities) with high population size and density. Brown and Swanson (2003) suggest that these measures remain valid determinants of rural and non-rural comparisons. Rural and urban, however, are not dichotomous nor are there discrete differences between them (Brown & Swanson). Additionally, rural areas differ in respect to their degrees of isolation and interaction with more urbanized areas. With increased communications technology and improved transportation, patterns of interaction between rural and urban places often overlap (Willits et al., 1982). However, variation does exist between places with different population densities, economic bases, and degrees of social isolation from other areas (Tickamyer, 2000). Therefore, the use of rural and non-rural ideal types is needed to compare places.
Although there is no satisfactory way to differentiate rural and urban areas (Isserman, 2005), there are two aspects that must be considered. First, the use of community classifications that use data smaller-level measures than the county-level are necessary to account for rural parts of large counties and urban clusters classified as metro (H. F. Goldsmith et al., 1992). Second, classifications should differentiate between levels of rural and urban populations to capture variance in social isolation within different types of rural and urbanized areas (Brown & Swanson, 2003; Isserman, 2005). Willits, Bealer, and Crider (1982) argue that “rural persons and communities are not all alike. They do not present a single, united, or differentiated position on any characteristic.” (p. 74). Specifically, there is a distinct difference between rural areas on the fringe of metropolitan areas that have experienced recent rapid growth and development and those that are more remote (LeSage & Charles, 2008). The rural fringe often characteristically falls into categories representative of both suburban and rural (Sharp & Clark, 2008). Similarly, small towns that represent urbanized clusters near larger metro areas will likely be different than small towns in more distant and remote areas. Unfortunately, rural fringe areas are often included with all rural areas for analysis and this approach may distort results related to rural conditions. Some researchers, however, have chosen to combine rural fringe with suburban classification (e.g., Roscigno et al., 2006). Although the research is still unclear on how to best differentiate suburbs, rural fringe, small towns, and rural areas, rural fringe is expected to be “somewhere in between” rural and urban and should be considered separately from other rural areas (Kozeny, 2005, p. 129).
Isserman (2005) suggests that practical limitations require researchers to start with the county-level data provided by government statistics, but suggests a progression towards a more continuous categorization of places to better capture variation within and between types of locations. The NCES system (Provasnik et al., 2007) provides classifications of rural and non-rural areas that is more consistent with recommendations to further delineate different types of rural, suburban, and urban locations on a smaller-unit scale. NCES uses geographic information system technology, combined with OMD and Census Bureau data to classify school communities, based on latitude and longitude coordinates, in relationship to commuting distance to urban centers. The NCES classification system categorizes locations in 4 main classifications (city, suburban, town, and rural) and 12 sub-classifications (3 within each main classification). This process does not rely on county boundaries and allows for a differentiation between remote rural areas and those located nearer to urban areas (Provasnik et al.). Overall, the NCES system provides a useful conceptualization of the rural-urban continuum, especially when studying school environments.

Because of potential limitations with cell sizes in the study sample, and consistent with previous research (Roscigno et al., 2006), I combined NCES categories for comparison. Urban and suburban categories were collapsed. Because of the expected differences between rural fringe communities and more remote rural areas, town and rural classifications were separated and merged dependent on degree of social isolation. The classifications used in this study are shown in Table 7.
Table 7

Community Locale Classifications

<table>
<thead>
<tr>
<th>Locale Classification</th>
<th>NCES Codes included in Classification</th>
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<tbody>
<tr>
<td>Urban</td>
<td>Large City</td>
</tr>
<tr>
<td></td>
<td>Midsize City</td>
</tr>
<tr>
<td></td>
<td>Small City</td>
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<tr>
<td>Suburban</td>
<td>Large Suburb</td>
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<tr>
<td></td>
<td>Midsize Suburb</td>
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<tr>
<td></td>
<td>Small Suburb</td>
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<tr>
<td>Rural Fringe</td>
<td>Town Fringe</td>
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<tr>
<td></td>
<td>Rural Fringe</td>
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<tr>
<td>Rural</td>
<td>Rural Distant</td>
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<td></td>
<td>Rural Remote</td>
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<td></td>
<td>Town Distant</td>
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<td>Town Remote</td>
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School composition. Geographic disparities in access to supportive school environments for LTPA may be a product of the characteristics of individuals attending these schools. These individual population characteristics are expected to influence the type and amount of environmental support provided by schools. For example, Johnston, Delva, and Murphy (2007) found that a school’s percentage of minority students and SES composition were related to the types of extracurricular physical activities offered, with schools
comprised of high minority and low SES student populations providing fewer opportunities. Additionally, other researchers have suggested that the size of a school’s enrollment will affect the programs and policies for extracurricular sport and physical activity (Cohen et al., 2007; Tompkins et al., 2004). Therefore, because schools in rural areas are likely to be smaller, and be comprised of higher concentration of minority and lower SES students than more urban areas (R. P. Harris & Worthen, 2003; Sharp & Parisi, 2003; Tompkins et al., 2004), these schools may have fewer environmental supports for LTPA.

To control for school compositional factors, I included measures of school enrollment, percent minority, and percent economically disadvantaged. All school compositional measures were obtained from the 2007-2008 North Carolina Public School Report Cards provided by the North Carolina Department of Public Instruction available at www.ncschoolreportcard.org/src. Figures were taken from NC Department of Public Instruction’s Reports of Supplemental Disaggregated State, School System (LEA) and School Performance Data for 2007-08. These data record the number of students taking the End-of-Grade reading and mathematics tests at each school. Total school enrollment was measured as the number of students in schools that were classified as “middle schools.” For schools that were classified as elementary schools (i.e., grades K-8), junior/senior high schools (i.e., grades 7 – 12), or union schools (grades K-12), only the student population in middle grades 6, 7, and 8 who would be eligible to participate in extracurricular middle school sports and physical activities were included.
The 2007-2008 school year is the most recently-available composite data on public schools in North Carolina. Because school populations rarely change from year-to-year, these data are expected to accurately portray current conditions in North Carolina middle schools. The exception to this assumption, however, occurs when LEAs re-district school attendance zones or open new middle schools within the district. Three LEAs in this study were identified as having engaged in one of these activities between the end of the 2007-2008 school year and the beginning of the 2008-2009 school year. Compiling individual principal reports of daily attendance for the 2008-2009 school year, I partially replicated the composition data for the schools in these LEAs to determine if any potential significant changes in school composition occurred. Using repeated-measures ANOVA for total enrollment and percent minority, I compared the composition of schools from 2007-2008 and 2008-2009. Likely because of growth patterns and phased opening of new schools, schools that were active in 2007-2008 experienced a mean reduction of only six students with the opening of new schools in 2008-2009. This variance was not statistically significant (\( p = .680 \)). Older schools did experience a statistically significant (\( p < .001 \)) increase in the percent of minority enrollment with the opening of new schools. However, most of this change was accounted for by one urban LEA that opened two new middle schools in the fall of 2008. The average minority enrollment in existing schools within this LEA increased from 29% to 33%. Although this change was statistically significant, the difference of 4% minority composition was not expected to substantially alter the characteristics of these
schools. Therefore, it was determined that the 2007-2008 enrollment figures would be valid for this analysis.

As a final measure of school composition, I measured whether the school was an extended elementary school (i.e., containing grades K-8). Extracurricular programs, particularly for physical activity, rarely exist in elementary schools (S. M. Lee et al., 2007; Lounsbery et al., 2007). Therefore, I anticipated an elementary school “mentality” might exist among teachers and administrators in this type of schools that deemphasized extracurricular physical activity programs for students in the middle grades.

**Community context and social functioning.** Ecological attributes of geographically-defined (i.e., contextual place effects) are also expected to exist beyond those explained by school composition. Contextual factors traditionally refer to the physical environment, material infrastructure, and services provided to the local population (Macintyre et al., 2002). The ability to provide specific environments for health promotion, such as LTPA, is directly related to the availability of community-level economic resources (Abercrombie et al., 2008). In this case, the provision of supportive environments for LTPA and services are expected to be largely influenced by distributable economic resources available to schools (Bernard et al., 2007; Morton, 2003). The principle determinant of accessible resources for LTPA is often the availability of public funding (Cohen et al., 2007; Lounsbery et al., 2007). Wechsler et al. (2000) suggested that a lower tax base and fewer capital resources in poorer areas may restrict their abilities to provide supportive environments for adolescent LTPA. Similarly, due to financial constraints (Lounsbery et al.), the availability of sufficient human resources
needed to implement programs is likely to be lower in socially and economically deprived areas (Wechsler et al.).

One underlying concern of the current research is how contextual effects emerge on two levels. Schools and, by extension, their communities are expected to differ in their access to economic resources and social cohesion. However, resources and social cohesion at the LEA level are expected to influence overall environmental support across districts. The question remains whether place disparities emerge at the school/community or district level. To account for the differential influence of these two levels, data were collected both at the school/community and LEA level. Collecting data specifically for a school population and LEA were straightforward as clear delineations between schools and districts exist. However, designating a community or, in the case of large cities, a neighborhood that corresponds to an independent attendance area for a school is more difficult.

Schools are generally assigned according to geographic location. Measuring these attendance areas with complete accuracy would require some process of coordinating census delineated areas with individual maps for each of the 115 LEAs in the state. Since that process was not feasible, to measure fixed community characteristics for each school independently, I estimated attendance area using the full list of middle schools in North Carolina. If a school was the only middle school assigned to a postal ZIP code, that level was used as an approximation for the attendance area. A total of 184 school communities (55.6%) in this study were analyzed at this level. If multiple schools shared a ZIP code, its census tract was used. A total of 135 (40.8%) of schools in this study were analyzed at this
level. Finally, for 12 rural schools, the ZIP code was smaller than its census tract, suggesting the existence of schools in very remote towns that serve a larger rural area. For these schools, the census tract was used for community analysis.

This system of delineating school communities is imperfect. While nearly all North Carolina LEAs assign school attendance solely on geographic proximity, at least one large district maintains a policy of distributing low income students throughout the LEA via bussing. Additionally, some overlap in attendance zones may occur in small communities or in rural towns with multiple schools in multiple ZIP codes. Finally, though larger census tracts may provide a reasonable approximation of school attendance areas in smaller cities and towns, operationalizing these areas in large cities may be more problematic due to smaller geographic scales. However, evidence has suggested few differences exist among different measurements of urban neighborhoods (e.g., Lovasi et al., 2008). Therefore, to maintain independence of fixed school/community-level effects, the census tract was used in these areas. Overall, despite the limitations of these measures of school community, they should provide a good approximate measure of the proximate residential area to the school location. Additionally, regardless of school assignment policies, children of residents within the immediate area of a school are more likely to attend that school.

Public schools are dependent on local tax sources to provide funding for curricular and extracurricular facilities and programs. Traditionally, these funds have been generated through local property taxes (Glickstein, 1995). A vast literature has developed around the historical inequality of school funding policies that rely on local taxes (e.g., P. B. Walters,
Most importantly, local funding and control of schools, particularly in the South, has created a legacy of school inequality related to geographic location. Initially, disparate funding of schools based upon race was a deliberate policy tool of state governments in the South to maintain segregationist policies and prevent Blacks from passing Jim Crow-era literacy tests required to register to vote (Christensen, 2008; P. B. Walters). Following the U.S. Supreme Court’s decision in *Brown vs. the Board of Education of Topeka* and the legal dismantling of ‘separate but equal’ state policies, local funding of schools remained a powerful way of maintaining class differences in educational quality.

Historically, North Carolina has been more progressive than other Southern states in trying to alleviate disparities caused by a reliance on local tax bases to fund education (Christensen, 2008). Currently, the state funds 66.9% of public education, compared to 24.4% of all school expenses that are funded from local sources (Division of School Business, 2008). However, state allocation for schools is limited to curricular programs and teacher salaries. Of the nearly $70 million spent on school-sponsored extracurricular activities in North Carolina public schools in 2007-2008, less than 1/2 of 1% came from sources outside of the local school district. Therefore, since rural school districts are likely to have lower economic bases from which to draw tax revenue (Tickamyer, 2000), they are expected to have fewer resources to support extracurricular sport and physical activity.

In North Carolina, school districts are provided two main sources from which to acquire tax revenue for education: local property taxes and local sales and use taxes (Division of School Business, 2009). To measure district-level economic resources for schools, I used
the per-pupil expenditure (PPE) attributed to local funding sources obtained from NCDPI (Division of School Business, 2008). It is important to note an important flaw in the use of this measure of school funding. Namely, the use of per-pupil expenditure fails to accurately account for the aggregated effect of funding across large school districts (Thorson, 2006). For example, North Carolina’s smallest school district (Hyde County Schools) has an overall per pupil expenditure ($16,310.19) that is twice as large as that of its largest school district (Wake County Schools). Aggregated over the middle school populations of these two districts, Hyde County’s total middle school expenditure for 123 students is approximately $2 million, while Wake County’s total expenditure for 964 students is approximately $8 million. Based on economies of scale, Wake County Schools have significantly higher buying power with lower per-pupil expenditure than the smaller school district with much larger per-pupil expenditure (Thorson).

Additionally, PPE is only one source of school-level economic resources. Local schools often rely on localized fundraising efforts through parent groups, such as the Parent-Teacher Association, to enhance a school’s discretionary income. This process allows schools who can locally draw on more affluent residents to gain some advantages over schools located in less affluent communities even within the same school district (Condron & Roscigno, 2003). The context of community location is expected to be independent of school population. That is, support for schools and school programs and parent involvement may be higher when the school is located in a more affluent community or urban neighborhood regardless of student population (Goldbring, Cohen-Vogel, Smrekar, & Taylor, 2006; Lauen,
2007). For example, high income parents whose children are assigned to a public school in a poor neighborhood or community may elect to send them to a private school or enroll them in extracurricular activities outside of the school environment (Lauen). To measure potential available resources at the school/community level, median household income was obtained from the U.S. Census for the estimated school attendance area. While this item cannot specifically account for direct school revenues for extracurricular programs, it potentially provides a satisfactory measure of the absolute level of economic resources available within a school community that may be deployed to provide supportive environments for LTPA in local schools.

Community contextual factors are also significantly shaped by collective social functions. While the absolute level of available resources for allocation is important to provide infrastructure, how these resources are prioritized and distributed may explain variation in environments between and within communities (Abercrombie et al., 2008; Crompton & West, 2008; McNeill et al., 2006). Collective aspects of community structures are expected to influence a population’s capability to support common goals and collective action (i.e., social capital or social cohesion) (Coleman, 1988; Putnam, 2000; Sampson, 2001; Wilkinson, 1991).

Because policy and politics occur at a larger geographic scale, traditional neighborhood conceptualizations of social capital or social cohesion alone may not be the best approach to understanding their role in influencing the provision of public goods or involvement in community programs (Szreter, 2002). Additionally, measures of social
capital as a predictor often lack consensus, are overly complex, and fail to capture the underlying community issues and context that are of real interest (Durlauf, 2002; Morrow, 1999; Rupasingha et al., 2006). Often, measuring social capital as a predictor variable also forces the researcher to assume Putnam’s (2000) viewpoint of naturally generated trust and reciprocity that creates social capital from the ‘bottom up’ (Letki, 2008; Marschall & Stolle, 2004). An alternative approach is to measure the cultural and historical social contexts that provide the antecedent conditions for levels of community social cohesion and collective action (Morrow). Therefore, to account for differences in community social conditions, I measured racial heterogeneity and income inequality at the district level, estimated percent of the community population that is Black and in poverty, the community population’s level of education, and average daily commute time to work.

Racially diverse communities tend to have lower levels of social capital compared to more racially homogenous communities (Costa & Kahn, 2003; Hallberg & Lund, 2005; Putnam, 2007). Putnam (2007) suggested that racial differences directly contribute to at least a short-term erosion of social capital. Particularly in U.S. studies, researchers have identified a strong and negative association between racial and ethnic heterogeneity and social capital or social cohesion (Alesina et al., 1999; Hero, 1998, 2003a, 2003b; Letki, 2008; Putnam, 2007; Sampson & Groves, 1989; Sampson et al., 1997). In general, individuals living in racially heterogeneous areas are less connected socially, less likely to be involved in community activities, have lower expectations of local government and leaders, and are less likely to engage in collective action (Alesina & La Ferrara, 2000; Putnam, 2007; Rupasingha
et al., 2006). In the South, which was the setting for this study, racially heterogeneous communities often contain a historically-privileged White majority population with large concentrations of racial and ethnic minorities (Forbes, 1997). Building from Blalock’s (1967) threat hypothesis and conflict theory, the presence of a high concentration of racial and ethnic minorities may illicit higher levels of prejudice among members of the majority (Alesina & La Ferrara, 2002).

To measure racial heterogeneity at the district level, I used an entropy index based upon a calculation of Theil’s (1972) $H$, which is computed from the proportion of the population identifying as different racial and ethnic groups (Hansmann & Quigley, 1982). The formula used to calculate Theil’s $H$ for heterogeneity was:

$$H_R = \sum_{i=1}^{N} p_i \ln \frac{1}{p_i}$$

Where $p_i$ is the proportion of the community’s population that identified as White, non-Hispanic only, Black, non-Hispanic only, Hispanic only, or Other. Theil’s $H$ was calculated using a formula developed in Microsoft Excel. The Theil index is preferred when accounting for heterogeneity of discrete groups, such as race and ethnicity (Allison, 1978). Like many measures of race or ethnicity, Theil’s index is limited because it forces the assumption of race and ethnicity as mutually exclusive categories (Hansmann & Quigley). However, despite this limitation, and because of the nature of the self-identification process by which these data were originally collected (Hansmann & Quigley), this measure remains valid as an account for membership in population sub-groups for individuals. Another issue inherent to
the Theil index is that it does not provide an intuitive or bounded measure of racial heterogeneity (Sen & Foster, 1997). If all members of a community are of the same race or ethnicity, its value will be 0. As racial or ethnic heterogeneity increases, its value increases. However, the Theil index is sensitive to overall population size and can exceed a value of 1 in the presence of high heterogeneity within a highly populated area.

Income inequality is a significant hindrance to the development of community-wide social capital. Rupasingha et al. (2006) argued “When society’s rewards become more unevenly distributed, people may feel exploited by others, thus diminishing their faith in fellow citizens” (p. 91). When lower income community residents perceive conditions of economic inequality, interests become more polarized and community cohesion is less likely to occur (Fehr & Schmidt, 1999; Letki, 2008). Individual concern for meeting basic needs among low income residents may also prevent their active participation in community projects. Additionally, social networks rarely develop between people with large differences in income, particularly when economic capital is used as a means of symbolic power (Alexander, 2007). Finally, higher income residents may choose not to support communal public goods that they perceive to disproportionately benefit lower income members of the community (Stephens, 2008). To measure income inequality, I used household income data obtained from the U.S. Census Bureau and calculated a Gini coefficient for each school district.

Gini’s (1921) coefficient is the most widely-used measure of income distribution (Allison, 1978; Milanovic, 2005). The Gini coefficient for a community ranges from zero
when all households receive an equal income to one when all income in a community is received by a single household (Hansmann & Quigley, 1982). Although the Gini coefficient is a complicated and onerous measure, it can be explained in relatively simple terms.

According to Milanovic (Milanovic):

First, it sums absolute income differences across all $N$ individuals. Thus, if one person’s income is 10 and another’s 6, there would be two interpersonal comparisons, and the results will be $(10 - 6) = 4$ and $|6 - 10| = 4$. All of these distances are then added up, and to find the average distance their total sum is divided by the total number of such comparisons ($N^2$). The result is in turn “mean-normalized,” that is, divided by the mean income of the group, and is further divided by 2 to make the value of the coefficient lie between 0 and 1. (p. 196)

In its true form, the formula for calculating the Gini coefficient is written as:

$$G = \frac{1}{N^2} \sum_{i=1}^{N} \sum_{j=1}^{N} \left| x_i - x_j \right|$$

Where $\mu$ represents mean income, and $x_i$ is the income of $i$-th individual (Allison; Milanovic). The Gini coefficient is a calculation of twice the area of a plotted Lorenz curve, showing the proportion of an area’s population ($X$ axis) relative to their proportion of income ($Y$ axis). A straight diagonal line represents true income equality; if any two individual have unequal incomes, the Lorenz curve will fall below that line in proportion to the degree below the mean income received by that percentage of the population (Allison).

The Gini coefficient in this form requires data that is ratio-scaled and available for each individual household. Unfortunately, U.S. Census data are incompatible with this requirement in two ways. First, household income data is aggregated by geographic location and publically unavailable at the household level. Second, household income is reported in an 12-level interval scale with ranges from Less than $10,000 to More than $250,000. As
long as interval data are frequencies that are based upon underlying ratio scale data (which, for income, is assumed to be log-linearly distributed), then modified calculations of the Gini coefficient will yield valid comparable estimates (Allison, 1978; Blau, 1977). The interval frequencies must first be converted to an estimated ratio scale. Though standard errors are expected to be higher when using grouped data, the Gini coefficient is less sensitive than other measures of inequality to these transformations (Seiver, 1979). For census data, arithmetic midpoints were calculated within the range of each cutpoint from the scale used by the 2005-2007 American Community Survey. Values for the lower (less than $10,000) and upper (more than $200,000) bound categories were estimated at $5,000 and $250,000. This process may suppress information for households with extremely large incomes, but, because of the low numbers of these cases, will capture the nature of inequality in communities.

Because individual household data were not available, the entire Lorenz curve for communities in this study was not known. Therefore, for the Gini coefficient, I used a modified calculation for interval and frequency data that approximates the Lorenz curve based on the cumulated proportion of population and income (Abounoori & McCloughan, 2003; Lorenz, 1905). With grouped data, only specific points along the Lorenz curve are known, therefore a technique was used that interpolates the values between intervals (Mehran, 1975). The formula for the modified Gini coefficient used in this study was:

\[ G = 1 - \sum_{i=1}^{N} (X_i - X_{i-1})(Y_i + Y_{i-1}) \]
Where $X_i$ is the indexed cumulated proportion of the total population within group $i = 1 – N$, and $Y_i$ is the cumulated proportion of the estimated total income received by group $i = 1 – N$. Calculations for the Gini coefficient were performed using a formula built in Microsoft Excel.

A final key factor that influences levels of social capital in communities is the level of education across the population. It is well-documented in the literature that a highly educated population, regardless of other population demographics, leads to higher levels of social capital and collective action (Glaeser et al., 2002; Helliwell & Putnam, 1999; Putnam, 1995). In fact, education may be the strongest predictor of community-level social capital in the U.S. (Alexander, 2007; Rupasingha et al., 2006). Level of education is often perceived to be an important determinant of individuals’ attitudes, beliefs, and behaviors. It is expected that higher levels of education across a population brings with it increased levels of civic engagement and involvement in community-wide objectives (Putnam, 1995; Rupasingha et al.). Finally, a more highly educated population may be more supportive of public provisions of goods and services. To measure level of education, I used the percentage of population within a school community over the age of 25 with at least a bachelor’s degree. This measure was obtained from the U.S. Census.

Because of increasing distances between households and places of work, commuting times may affect levels of environmental supports for extracurricular sport and physical indirectly by inhibiting the development of social capital (Flora & Flora, 2003; Putnam, 2000). Mobility is more difficult in rural areas (Wimberley & Morris, 1997) and increased
commuting times may prevent parents in these areas, who might otherwise become involved in school programs, from volunteering or advocating for school resources. For commuting time, I used the mean time in minutes for commuting to work at the county level. Because little variation is expected in commute times within county boundaries, the county-level measure was fixed to the school level.

As a final social measure, I wanted to account for cultural differences in approaches to school-sponsored physical activity that might exist in different community types. While extracurricular programs in schools have the potential to promote LTPA among a wide range of students, schools in U.S. often organize extracurricular physical activity in a way that prioritizes interscholastic sports for a school’s best athletes, rather than intramural sports or physical activity clubs. Interscholastic sport is often recognized as a quintessential “All-American” institution and as an identifier of the preferred ideological values of the cultural mainstream. Extracurricular school physical activity has increasingly become relevant solely as the public ritual of interscholastic school sports (Miracle & Rees, 1994). Additionally, interscholastic football and boys’ basketball programs play a key role in providing talent for the sports-entertainment industry. Media companies and promoters are also just beginning to realize the potential revenues available in marketing these sports as an entertainment product in their own rights. Rather than using extracurricular physical activity as a means of improving the health of students, schools may emphasize interscholastic sport’s perceived cultural importance in connecting communities and building school spirit or providing low income adolescents with opportunities for economic and social mobility. This idea may be
especially true in rural areas that lack in other entertainment options, communities tied to old economic values, or communities with high minority populations (Miracle & Rees).

It is unlikely that middle schools organize their extracurricular sport and physical activity programs specifically for spectator entertainment or as a direct link to college scholarships or professional contracts. Rather, some middle schools may see themselves as a conduit between recreational competitive youth sports and high school athletic programs. Woods (2007) suggested that successful high school athletic programs, in terms of winning, are built through developing a community-wide system to introduce sport skills, strategies, and values to younger children. High school coaches, therefore, who seek to build a long-term dynasty in specific sports often establish direct ties with middle school coaches and administrators to ensure the development of young athletes in a way that best fits the needs of the high school program. Additionally, parents with visions of their son starring for the local high school team may see opportunities to focus on similar sports in middle school as an appropriate training ground. If a local area is culturally linked to a successful high school athletic program, therefore sport programs at all levels of youth and adolescence, including middle school, may be organized in a way to best support that program’s on-field success. The most visible interscholastic sports that may lead to an emphasis on entertainment and talent development at the middle school level are football and boys’ basketball. Therefore, high school success in these two sports may reflect a narrow emphasis on interscholastic sports, rather than broad, inclusive extracurricular physical activities, at the middle school level. To control for this potential effect, I measured high school athletic success as the
number of appearances of a middle school’s feeder high school in the North Carolina High School Athletic Association (NCHSAA) regional championships in both football and boys’ basketball since 1972. These data were obtained from the NCHSAA record book at http://www.nchsaa.org.

A conceptual model of how these variables explain school-level supportive environments is displayed as Figure 5.

*Figure 5.* Conceptual model of the influence of school composition, contextual resources, and social functioning on environmental support for school LTPA at the community level including study variables.
In summary, the community locale of a school is expected to predict the level of environmental support for extracurricular sport and physical activity. In part, spatial differences in support will be explained by school compositional factors (e.g., enrollment, percent minority, percent economically disadvantaged, and whether the school is an extended elementary school). Individual interests, constraints, motivations, and demand in specific areas may determine the type and level of environmental support provided by the school. Additionally, school composition may influence patterns of resource allocation. Community context and social functioning are also expected to explain spatial differences in environmental support. District PPE and community median household income reflect absolute levels of available economic resources for school facilities and to implement school programs and policies. District PPE represents the resources allocated from governmental entities to schools that can be deployed to increase environmental support across the district level. Community median household income represents more localized resources from which schools may draw additional resources through fundraisers, contributions, and similar support that are essential for providing extracurricular programs. Racial heterogeneity and income inequality at the district level and level of education and commute times at the community level are expected to influence social capital and the allocation of human resources and support for school programs. Lower levels of social cohesion and functioning may lead to fewer volunteers in schools to help organize programs, lobby for increased district funding, or spearhead fundraising campaigns. Additionally, districts and communities with higher inequality may experience higher attrition from public services
from more socially privileged social groups as they choose to seek services in the private sector (i.e., private schools). Finally, a community culture tied to high school sport success may reduce support for broad, inclusive physical activity programs at the middle school level in favor of interscholastic programs that sustain high school programs. The methods used to analyze the data in this study are outlined in the following section.

Data Analysis

In the initial stage of analysis, data from the web-based questionnaire were downloaded from Survey Monkey into a Microsoft Excel spreadsheet. Matching data from the U.S. Census, NCES, NCDPI, and NCHSAA were entered into the spreadsheet. Data were screened for accuracy of data entry and missing values. After all data were entered into the spreadsheet, each entry was assigned a unique school identification number and school district identification number. Original school identifiers were expunged from data records. The data file was imported into SPSS Graduate Pack 15.0 for Windows for initial analysis. Data were further screened in SPSS to examine their distributions to meet the assumptions of multivariate analysis. Specifically, the distribution of the dependent variable was examined and independent variables were screened for the presence of outliers, multicollinearity, and normal distribution. Preliminary analysis included generating descriptive statistics to examine the characteristics of the sample under study. Univariate statistics and correlation matrices were also used to explore patterns in the variables to be used in the statistical models. Descriptive comparisons were also made between this sample and a national sample of middle schools. Principal components analysis with varimax rotation was performed on
the composite environmental support index to statistically assign weights to its component items.

Following preliminary analysis, the data were exported to SAS 8.02 to analyze in a multi-level model framework. The “user-friendly” interface of SPSS allowed for a more straightforward initial analysis of these data. However, based upon its advanced capacity to estimate multi-level models, SAS Proc Mixed was preferred for the second phase of data analysis. Data on the lowest level of analysis in this study were expected to be grouped. That is, schools are hierarchically clustered within school districts. The statistical reality is that schools nested within the same unit will likely be more similar than those from a randomly selected sample. Additionally, district-level variables are expected to influence spatial differences in environmental support for extracurricular sport and physical activity. For example, school funding decisions and the sponsorship of interscholastic sports occur at the district, rather than the school level. The advantage of multi-level models is that they allow for a more accurate statistical analysis of clustered data. Failing to account for higher-level structural factors often neglects important sources of variance (Sibthorp, Witter, Wells, Ellis, & Voelkl, 2004). Additionally, standard regression procedures require the assumption of observational independence (i.e., cases under study are unrelated to each other) (Tabachnick & Fidell, 2007). This assumption is often violated within the research literature. When grouped data are included in a sample, their shared experiences will likely have some influence on their responses. As a result, researchers may report statistically significant effects when these differences are over-inflated, a Type I error (Tabachnick & Fidell).
Because of its hierarchical design, multi-level models are not dependent on this assumption and therefore, could help refine statistical analyses (Sibthorp et al., 2004).

The use of multi-level models prevents an “‘ecological’ fallacy or the Robinson effect” (Hox & Kreft, 1994, p. 284) of making interpretations about effects on one level of analysis from results of another level of data. Multi-level models (sometimes referred to as hierarchical linear models or HLM) due to the popular software package created by Raudenbush and Bryk) are regression equations using maximum likelihood estimation that allow the level of the dependent variable to vary across higher-level units (Sibthorp et al., 2004). Multi-level models assume a nested relationship between lower-level (Level 1) units and higher-level (Level 2) units. Sub-models are constructed for each level of nesting, with the ultimate goal being the creation of a single regression equation that simultaneously estimates the within-group and between-group variance on the predicted variable (Sampson et al., 1999; Sibthorp et al.).

The data in this study present some problems for the use of multi-level modeling techniques. Although schools are clustered within nearly 100 districts, with an average of over three schools per district, approximately 30% of the groups contain only one school. Low levels of clustering within groups may lead to biased estimations of multi-level models when comparing group differences (Clarke & Wheaton, 2007; Hox & Kreft, 1994). Although few authors have explicitly justified why small group sizes are problematic (Clarke & Wheaton), data sparseness at Level 1 may over-estimate Level 2 effects (Type I error). However, the undesirable effects of inflated standard errors due to small group sizes is
expected to be observed only in random effects (i.e., measuring differences within school districts) and have little impact on fixed effects (Theall et al., 2008). Similarly, adequate sample size at Level 2 is of paramount importance and data sparseness at Level 1 may be less critical when estimating models including few random effects (Clarke & Wheaton). One option when faced with low levels of Level 1 data is to ignore the hierarchical structure of the data and conduct an analysis using traditional regression techniques (South & Baumer, 2000). However, ignoring the hierarchical structure of data is problematic because of the likelihood of high standard errors due to the non-independence of data (Clarke & Wheaton). A second option is to use cluster analysis to merge similar Level-2 groups to increase the Level-1 samples within the artificially created groupings. While this process will increase within-group variance, it may lead to over-estimates of Level-1 fixed effects, because of the likelihood of heterogeneity of within the forced groups.

When between-group and within-group comparisons are not explicitly required, as is the case with this study, a more appropriate technique may be to adjust for the random effects of clustering as nuisance factors (Diez Roux, 2000). Multivariate strategies to analyze data in this way often use generalized estimating equations (GEEs) in a generalized linear model or single-level regression with robust standard errors (Cerin & Norman, 2009; Clarke & Wheaton). However, robust standard error techniques cannot simultaneously account for Level 1 and Level 2 predictors and GEEs are unstable in the presence of unbalanced data at Level 1 (Cerin & Norman). Because of the wide range of data clustering (1-23) and the theoretically assumed comparison between schools, rather than school districts, multi-level
modeling techniques are more appropriate and should be robust to analyze the data in this study (personal communication, E. Cerin, February 2009). Clarke and Wheaton (2007) also note that with sample sizes similar to the one included in this study, and only interpreting fixed slopes and a random intercept, Monte Carlo simulations indicated little empirical bias in using multi-level models.

For this analysis, I started with an unconditional means model and then added suitable Level 1 (School/Community level) and Level 2 (District Level) factors to arrive at the best fitting model. The unconditional model, which is effectively a one-way random effects ANOVA model, includes only the intercept (the random effect of school districts) and establishes whether differences in environmental support exist across school districts (Singer, 1998). In analyses beyond the initial unconditional model, the random effect of school districts serves only as a control for the clustering or nuisance effect of the data. In the second model, community type was added as a predictor of environmental support. In subsequent models, I added school composition, district and community resources, and social functioning items separately to examine what independent role these predictors have in explaining differences in environmental support by community type. Finally, additive models were fit to determine how school composition, community context, and social functioning collectively explain spatial differences in school supportive environments. Models were compared for goodness of fit by -2 Log Likelihood tests. Additional models without Community Type were estimated for each community type subgroup to analyze variance within community types.
Chapter Summary

This chapter outlined the methodology I used in this study. The purpose of this study was to determine whether local advantages and disadvantages exist in access to supportive environments for extracurricular school physical activity for middle-school aged adolescents in North Carolina. Based on this purpose, I began by presenting the research questions and hypotheses that guided the research design. The lowest unit of comparative analysis was identified at the school and community level.

I described the participants and study setting in the surveillance and analysis of environmental support for extracurricular sport and physical activity in North Carolina Middle Schools. Next, I outlined the process by which I developed and administered the instrument used to collect school-level data and how I obtained secondary analysis at the school, community, and district level. I then described how I operationalized measures of environmental support for extracurricular LTPA and the procedures for developing a composite index of environmental support. I also explained how I measured and operationalized explanatory variables included in the study. Finally, I summarized the plan for data analysis and clarified the use of multi-level models for this study. I concluded with a conceptual model that depicts the theoretical relationship among the variables in this study. In the next chapter, I will describe the results of the data analysis.
CHAPTER 4: ANALYSIS AND RESULTS

The purpose of this study was to determine whether local advantages and disadvantages exist in access to supportive environments for extracurricular school physical activity for middle-school aged adolescents in North Carolina. It also examined key institutional and community systems that may influence the provision of LTPA opportunities. The units of comparative analysis for this study were schools and their communities. Through the use of multi-level modeling, I sought to examine how contextual place disparities emerge at the school and community level as well as school district level. Multiple sources of data were integrated to analyze place disparities in access to supportive environments for LTPA in North Carolina middle schools. Aggregating environmental supports, I created a composite index for supportive environments for each school to use as a single dependent variable. Using linear mixed model techniques to control for non-independence of schools clustered within school districts and to compare school/community-level (Level 1) and district-level (Level 2) influences on environmental support, regression models predicting environmental support from school compositional factors, community contextual resources and collective social functioning were generated.

This chapter summarizes the results of the analyses used in this study. First, I will present descriptive statistics for components of the dependent variables. Next, I will present the results of the principal components analysis and aggregation of the environmental support index. Then, I will present descriptive statistics for the explanatory variables. Subsequently, I will discuss transformations of explanatory variables and present the univariate descriptive
statistics for all variables to be used in the statistical models. Finally, I present the process and results of developing multi-level regression models to predict environmental support for extracurricular sport and physical activity to examine how contextual place effects may influence the provision of LTPA in school settings.

**Summary of Dependent Variable Items**

Environmental support items were aggregated into a single index value and not examined separately in the primary analysis used in this study. Therefore, the purpose of this section is to provide some perspective on the basic conditions of environmental support found within middle schools in North Carolina.

*Programs.* A key indicator of a supportive environment for LTPA in school environments is the presence of broad extracurricular physical activity programs (including interscholastic sports, intramural sports, non-competitive physical activities, and free play) that has the potential to appeal to a wide range of students (Bocarro et al., 2006; Centers for Disease Control and Prevention, 1997; Floyd, Bocarro et al., 2008; K. Green et al., 2005; Leppke & Tenoschok, 2003; Lobstein et al., 2004; Lounsbery et al., 2007; National Association for Sport and Physical Education, 2002; Tompkins et al., 2004; Wechsler et al., 2000; World Health Organization, 2003; Young et al., 2007). For the purposes of this study, interscholastic sport refers to programs that provide competitive sports between different schools, whether varsity or club status (McKenzie, 2001). Intramural sport refers to programs that provide competitive sports within the school whether or not scores and
standings are kept (McKenzie). Physical activity clubs refer to non-competitive student physical activity groups that meet periodically (McKenzie).

This variable was measured as the number of activities offered in each program at each school in aggregated form. For interscholastic sports, each team the school offered was recorded as 1. Therefore, a school that offered separate boys’ and girls’ basketball teams and a co-ed golf team would receive a score of 3. Similar aggregation was performed on intramurals and physical activity clubs. Separate activity calculations were made for interscholastic sports, intramural sports, and physical activity clubs in order to prevent flawed results based on schools who offer a large number of interscholastic sports, but no intramurals or physical activity clubs. The availability of “open gym” or “free play” remained in its original form as an indicator variable.

Nearly all schools in this sample (98.8%) offered interscholastic sports to their students. The number of activities offered in interscholastic sports programs ranged from 3 to 20, with a mean of 10.94 ($SD = 2.86$). Table 8 presents a description of the popularity of individual interscholastic sports based on the percentage of all schools offering each activity.
The most popular interscholastic sports offered exclusively to girls were basketball (94.9% of schools), softball (92.4%), volleyball (88.6%), competitive cheerleading/spirit (73.5%), and soccer (68.0%). The most popular interscholastic sports offered exclusively to boys were basketball (94.9%), baseball (85.5%), football (74.3%), soccer (68.0%), and track and field (52.9%). The most popular sports offered as co-educational were golf (27.7%), wrestling (26.7%), soccer (21.1%), competitive cheerleading/spirit (21.0%), and football (15.9%).
Approximately half of the schools within this sample (48%) offered some form of intramural sport program or non-competitive physical activity clubs to their students. Overall, 38.8% of the schools within this sample offered intramural sports activities. The number of intramural sports offered within these programs ranged from 1 to 14 with a mean of 4.69 ($SD = 3.38$). A slightly larger number (39.1%) of schools offered non-competitive physical activity clubs to their students. The number of physical activity clubs offered by these schools ranged from 1 to 8 with a mean of 3.13 ($SD = 1.84$). The most offered intramural sports and physical activity clubs are presented in Table 9.
Table 9

*Number and Percentage of All Schools Offering Intramural Sports and Physical Activity Clubs (N = 325)*

<table>
<thead>
<tr>
<th>Activity</th>
<th>Number of Schools</th>
<th>% of All Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intramural Sports</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basketball</td>
<td>95</td>
<td>29.2</td>
</tr>
<tr>
<td>Volleyball</td>
<td>74</td>
<td>22.8</td>
</tr>
<tr>
<td>Flag football</td>
<td>61</td>
<td>18.8</td>
</tr>
<tr>
<td>Soccer</td>
<td>56</td>
<td>17.2</td>
</tr>
<tr>
<td>Baseball/softball</td>
<td>45</td>
<td>13.8</td>
</tr>
<tr>
<td>Whiffleball</td>
<td>34</td>
<td>10.5</td>
</tr>
<tr>
<td>Hockey (floor, field, or ice)</td>
<td>31</td>
<td>9.5</td>
</tr>
<tr>
<td>Frisbee golf</td>
<td>29</td>
<td>8.9</td>
</tr>
<tr>
<td>Track and field</td>
<td>25</td>
<td>7.7</td>
</tr>
<tr>
<td>Ultimate Frisbee</td>
<td>24</td>
<td>7.4</td>
</tr>
<tr>
<td>Badminton</td>
<td>19</td>
<td>5.8</td>
</tr>
<tr>
<td>Tennis</td>
<td>19</td>
<td>5.8</td>
</tr>
<tr>
<td>Bowling</td>
<td>18</td>
<td>5.5</td>
</tr>
<tr>
<td>Golf</td>
<td>18</td>
<td>5.5</td>
</tr>
<tr>
<td>Handball</td>
<td>17</td>
<td>5.2</td>
</tr>
<tr>
<td>Lacrosse</td>
<td>9</td>
<td>2.8</td>
</tr>
<tr>
<td>Other Intramural Activities*</td>
<td>&lt; 2%</td>
<td></td>
</tr>
<tr>
<td><strong>Physical Activity Clubs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cardiovascular fitness</td>
<td>70</td>
<td>21.5</td>
</tr>
<tr>
<td>Running/jogging club</td>
<td>70</td>
<td>21.5</td>
</tr>
<tr>
<td>Walking club/group</td>
<td>49</td>
<td>15.1</td>
</tr>
<tr>
<td>Jump rope</td>
<td>47</td>
<td>14.5</td>
</tr>
<tr>
<td>Dance</td>
<td>45</td>
<td>13.8</td>
</tr>
<tr>
<td>Non-competitive cheerleading/spirit</td>
<td>28</td>
<td>8.6</td>
</tr>
<tr>
<td>Weight training</td>
<td>28</td>
<td>8.6</td>
</tr>
<tr>
<td>Aerobics classes</td>
<td>23</td>
<td>7.1</td>
</tr>
<tr>
<td>Yoga</td>
<td>13</td>
<td>4.0</td>
</tr>
<tr>
<td>Other Physical Activity Clubs*</td>
<td>&lt; 2%</td>
<td></td>
</tr>
</tbody>
</table>

*a Other intramural activities included gymnastics/tumbling, martial arts, wrestling, ping pong, kickball, tug-of-war, archery, and dodgeball.
b Other physical activity clubs included rock climbing, hiking/backpacking, skateboarding, skating, skiing, swimming, bicycling, fishing, trap shooting, and “Dance Dance Revolution”.
Only two activities, basketball and volleyball, were more likely to be offered than not offered by schools with intramural programs. Sixty-three and 1/10 percent (63.1%) of these schools offered intramural basketball, compared to 34.9% not offering intramural basketball. Similarly, 49.3% of schools offering intramurals offered volleyball, compared to 48.6% of schools that did not. Most activities were offered as co-educational although some activities were offered exclusively to girls or boys in specific schools. Non-competitive cheerleading or spirit (10.2% of schools offering intramurals or physical activity clubs), dance (4.2%), and running clubs (3.4%) were the activities most likely to be offered exclusively to female students. Weight training (5%), intramural flag football (1.4%), and intramural basketball (1.3%) were the activities most likely to be offered exclusively to male students.

In this sample, 34.7% of schools offered “open gym” or free play to students during extracurricular times outside of the school day.

Facilities. Schools in this sample reported a mean of 1.84 indoor facilities ($SD = 1.01$), with a range of 0 to 6. Six schools had no indoor facilities. One hundred forty four (144) schools reported having only 1 indoor facility, while 98 had 2 indoor facilities and 77 reported having 3 or more indoor facilities. Nearly all schools had at least one gymnasium and over 10% of the schools had two or more gymnasiums. On average, schools reported having more outdoor facilities, with a mean of 4.87 ($SD = 2.18$). Nearly 3/4 of the schools in this sample had four or more outdoor facilities. A majority of schools reported having a softball field, baseball field, a general use field, and a combined football/soccer field on school property. Approximately 2/3 of schools in this sample that had local parks and
recreation departments reported having a shared use policy for facilities. Table 10 reports the type and number of facilities available at schools in this study.

Table 10

Types of Indoor and Outdoor Facilities Available For Extracurricular Sports and Physical Activities (N = 325)

<table>
<thead>
<tr>
<th>Facility</th>
<th>% of schools with at least 1 facility</th>
<th>% of schools with 2 or more facilities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Indoor Facilities</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gymnasium</td>
<td>94.2</td>
<td>10.8</td>
</tr>
<tr>
<td>Weight room</td>
<td>32.9</td>
<td>0.3</td>
</tr>
<tr>
<td>Wrestling room</td>
<td>14.8</td>
<td>0</td>
</tr>
<tr>
<td>Dance studio</td>
<td>12</td>
<td>0.6</td>
</tr>
<tr>
<td>Cardio fitness center</td>
<td>8.9</td>
<td>0.6</td>
</tr>
<tr>
<td>Indoor rock climbing wall</td>
<td>4.9</td>
<td>0.3</td>
</tr>
<tr>
<td>Indoor track</td>
<td>2.2</td>
<td>0.3</td>
</tr>
<tr>
<td>Other indoor facilities*</td>
<td>&lt; 1%</td>
<td></td>
</tr>
<tr>
<td><strong>Outdoor Facilities</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Softball field</td>
<td>80</td>
<td>4.9</td>
</tr>
<tr>
<td>Baseball field</td>
<td>78.5</td>
<td>4.3</td>
</tr>
<tr>
<td>General use field</td>
<td>64.6</td>
<td>8.6</td>
</tr>
<tr>
<td>Combined football/soccer field</td>
<td>61.2</td>
<td>3.4</td>
</tr>
<tr>
<td>Outdoor running/walking track</td>
<td>47.7</td>
<td>0.9</td>
</tr>
<tr>
<td>Outdoor basketball court</td>
<td>37.8</td>
<td>12.9</td>
</tr>
<tr>
<td>Exclusive soccer field</td>
<td>20.6</td>
<td>2.2</td>
</tr>
<tr>
<td>Outdoor tennis court</td>
<td>17.2</td>
<td>9.5</td>
</tr>
<tr>
<td>Exclusive football field</td>
<td>16.6</td>
<td>0.9</td>
</tr>
<tr>
<td>Outdoor volleyball court</td>
<td>10.8</td>
<td>1.2</td>
</tr>
<tr>
<td>Other outdoor facilities*</td>
<td>&lt; 2%</td>
<td></td>
</tr>
</tbody>
</table>

\* Other indoor facilities included indoor pool, cheerleading room with spring floor, multi-purpose fitness/exercise room, and traverse wall.

\* Other outdoor facilities included outdoor pool, playground, combined football/baseball field, combined softball/baseball field, and combined softball/baseball/soccer field.
School personnel seemed to partially negotiate a lack of indoor facilities by utilizing other areas within the school to conduct extracurricular sport and physical activity. Half of the respondents indicated that they regularly used the school cafeteria, 39.8% used an auditorium or multi-purpose room, 36.1% used regular classrooms, and 13.2% used the school’s media center for extracurricular physical activities. Additionally, 29.3% reported using a parking lot or blacktop area to conduct outdoor extracurricular physical activities.

Inclusive policies. Overall, 43.4% of all schools in this sample reported that special transportation (e.g., late activity bus) was available for students who participated in at least some extracurricular physical activities.

In this sample, 24.1% of middle schools offered some type of extracurricular sport or physical activity program for students with special needs. Among the schools offering these programs, 45.7% organized these activities themselves while an outside agency organized these activities at 54.3% of the schools.

Community Access and Partnerships. In this sample, 83.2% of schools allowed community-sponsored youth sports teams to use their facilities. Community-sponsored classes or lessons (e.g., dance classes or tennis lessons) were able to access facilities at 20.3% of schools. Community-sponsored, supervised “open gym” or free play was allowed at 25.2% of schools. Open access for children and adolescents for unsupervised free play was only permitted at 5.2% of schools in the sample.

Another important way in which linkages between schools and communities can enhance environmental support for physical activity is through collaborative partnerships.
Participants were asked if, over the course of a school year, their school would work with 11 different community organizations included in the SHPPS module to organize extracurricular sports or physical activities. Community partnership was measured by individual organization, whether the school had collaborated with any community organization, and as the percentage of organizations available in the community with which the school had partnered. Over 83% of schools partnered with at least one community organization; 58.7% partnered with two or fewer organizations. The results of community partnerships for the entire sample are presented in Table 11.

Table 11

*Community Organizations That Schools Partnered With to Organize and Promote Extracurricular Physical Activities*

<table>
<thead>
<tr>
<th>Organization</th>
<th>N</th>
<th>% of schools partnering&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parks and recreation department</td>
<td>312</td>
<td>72.1</td>
</tr>
<tr>
<td>Youth organization (e.g., Boys and Girls Club)</td>
<td>295</td>
<td>38.6</td>
</tr>
<tr>
<td>Health organization (e.g., American Cancer Society)</td>
<td>305</td>
<td>32.5</td>
</tr>
<tr>
<td>Local Business</td>
<td>311</td>
<td>26.7</td>
</tr>
<tr>
<td>College or university</td>
<td>299</td>
<td>24.7</td>
</tr>
<tr>
<td>Health department</td>
<td>306</td>
<td>23.2</td>
</tr>
<tr>
<td>Service club (e.g., Rotary)</td>
<td>307</td>
<td>15.6</td>
</tr>
<tr>
<td>Country club</td>
<td>296</td>
<td>15.2</td>
</tr>
<tr>
<td>Health or fitness club</td>
<td>299</td>
<td>13.0</td>
</tr>
<tr>
<td>Social services agency</td>
<td>307</td>
<td>11.7</td>
</tr>
<tr>
<td>Hospital</td>
<td>296</td>
<td>11.5</td>
</tr>
</tbody>
</table>

<sup>a</sup> Percentage reflects only those schools that have organization located within the community.
Composite Environmental Support Index

For this study, the individual characteristics of supportive environments for extracurricular sport and physical activity were aggregated into a composite index score. The descriptive statistics and metric descriptions of the 10 index variables used in this study in Table 12.
Table 12

*Composite Environmental Support Index Variables and Descriptive Statistics (N = 325)*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interscholastic sports</td>
<td>Number of activities normalized and standardized to a range of 0 to 1</td>
<td>.540</td>
<td>.154</td>
</tr>
<tr>
<td>Intramural sports</td>
<td>Number of activities normalized and standardized to a range of 0 to 1</td>
<td>.129</td>
<td>.222</td>
</tr>
<tr>
<td>Physical activity clubs</td>
<td>Number of activities normalized and standardized to a range of 0 to 1</td>
<td>.153</td>
<td>.239</td>
</tr>
<tr>
<td>Open gym or free play for students</td>
<td>Yes = 1, No = 0</td>
<td>.35</td>
<td>--</td>
</tr>
<tr>
<td>Indoor facilities</td>
<td>Number of facilities normalized and standardized to a range of 0 to 1</td>
<td>.307</td>
<td>.169</td>
</tr>
<tr>
<td>Outdoor facilities</td>
<td>Number of facilities normalized and standardized to a range of 0 to 1</td>
<td>.375</td>
<td>.167</td>
</tr>
<tr>
<td>Special transportation</td>
<td>Late activity bus available for some activities = 1</td>
<td>.433</td>
<td>--</td>
</tr>
<tr>
<td>Programs for students with disabilities</td>
<td>Yes = 1, No = 0</td>
<td>.24</td>
<td>--</td>
</tr>
<tr>
<td>Community use of facilities</td>
<td>Available for sports and other physical activities = 1, Available only for sports teams = .5, Not available for community use = 0</td>
<td>.477</td>
<td>--</td>
</tr>
<tr>
<td>Community partnerships</td>
<td>At least one collaborative partnership = 1</td>
<td>.834</td>
<td>--</td>
</tr>
</tbody>
</table>
Principal components analysis (PCA) of the indicators was chosen to account for the relative importance of individual items within the scale (Esty et al.). The combination of these factors accounts for the total variance in the index explained by the measured components.

The Kaiser-Meyer-Olkin (KMO) measure was used to compare observed correlation coefficients to partial correlation coefficients. Higher KMO measures indicate that observed correlations between pairs of variables can be explained by other variables and that the data are appropriate for factor analysis techniques (Norušis, 2007). The KMO measure was estimated at .578, which is mediocre, but above Kaiser’s (1974) .50 threshold to indicate the use of factor analysis to be unacceptable. KMO measures for individual variables suggest all were acceptable for inclusion in the PCA, although Interscholastic Sports and Intramural Sports demonstrated measures close to unacceptability. Using the Eigenvalue threshold of $\lambda > 1$, four components explaining 57% of the variance in the data were extracted using PCA. The decision to keep four components was confirmed by examining the scree plot. The first substantial change in slope for the line was observed at the plot of the fourth component. The total variance explained is shown in Table 13 and the scree plot is presented in Figure 6.
Table 13

*Total Variance Explained by PCA for Index Items*

<table>
<thead>
<tr>
<th>Component</th>
<th>Initial Eigenvalues</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>% of Variance</td>
<td>Cumulative %</td>
</tr>
<tr>
<td>1</td>
<td>2.043</td>
<td>20.43</td>
<td>20.43</td>
</tr>
<tr>
<td>2</td>
<td>1.453</td>
<td>14.53</td>
<td>34.96</td>
</tr>
<tr>
<td>3</td>
<td>1.196</td>
<td>11.96</td>
<td>46.92</td>
</tr>
<tr>
<td>4</td>
<td>1.005</td>
<td>10.04</td>
<td>56.97</td>
</tr>
<tr>
<td>5</td>
<td>0.942</td>
<td>9.42</td>
<td>66.39</td>
</tr>
<tr>
<td>6</td>
<td>0.880</td>
<td>8.80</td>
<td>75.20</td>
</tr>
<tr>
<td>7</td>
<td>0.754</td>
<td>7.54</td>
<td>82.73</td>
</tr>
<tr>
<td>8</td>
<td>0.748</td>
<td>7.48</td>
<td>90.21</td>
</tr>
<tr>
<td>9</td>
<td>0.641</td>
<td>6.41</td>
<td>96.62</td>
</tr>
<tr>
<td>10</td>
<td>0.338</td>
<td>3.38</td>
<td>100</td>
</tr>
</tbody>
</table>

*Note:* Extraction method was principal components analysis.
Figure 6. Scree plot of principal component analysis of environmental support index items.

Using a Varimax rotated loading matrix, factor loadings were squared to avoid negative weights and summed for each index item across all components (Esty et al., 2005). Weights were then re-scaled to reflect their proportion to the maximum index score of 10. The rotated component loading matrix and index weights are presented in Table 14.
### Table 14

*Rotated Component Loading Matrix and Index Weights*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Component</th>
<th>Σ(scores)$^2$</th>
<th>Weights (Scaled to 10)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Interscholastic sports</td>
<td>-0.213</td>
<td>0.531</td>
<td>-0.031</td>
</tr>
<tr>
<td>Intramural sports</td>
<td>0.903</td>
<td>-0.031</td>
<td>0.027</td>
</tr>
<tr>
<td>Physical activity clubs</td>
<td>0.847</td>
<td>0.143</td>
<td>0.136</td>
</tr>
<tr>
<td>Open gym</td>
<td>-0.046</td>
<td>-0.059</td>
<td>0.600</td>
</tr>
<tr>
<td>Indoor facilities</td>
<td>0.206</td>
<td>0.694</td>
<td>0.087</td>
</tr>
<tr>
<td>Outdoor facilities</td>
<td>0.179</td>
<td>0.625</td>
<td>0.079</td>
</tr>
<tr>
<td>Special transportation</td>
<td>0.061</td>
<td>0.048</td>
<td>0.077</td>
</tr>
<tr>
<td>Programs for students</td>
<td>-0.004</td>
<td>0.074</td>
<td>0.574</td>
</tr>
<tr>
<td>with disabilities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Community use of facilities</td>
<td>0.081</td>
<td>0.116</td>
<td>0.611</td>
</tr>
<tr>
<td>Community Partnerships</td>
<td>0.101</td>
<td>0.088</td>
<td>0.575</td>
</tr>
</tbody>
</table>

*Note:* Rotation method was Varimax with Kaiser normalization. Bold indicates highest component loading score per variable.

Component loading scores indicated some intuitive results. Facilities variables loaded together on the second component, suggesting a relationship between amount of indoor and outdoor facilities. The amount of interscholastic activities is largely independent of the amount of intramurals and physical activities offered at schools in this sample.
Interestingly, interscholastic activities, but not intramurals or physical activity clubs, seems to be at least somewhat tied to the available indoor and outdoor facilities. This result may be related to an increased need for interscholastic sports to use specialized facilities (i.e., baseball field) in comparison to more informal activities. With the exception of special transportation, binary variables tended to load together, rather than their theoretically expected component\(^1\). This effect would likely be problematic if the purpose of PCA in this instance was to derive correlated dimensions of environmental support.

The results of weighting procedures indicated that school-level variation on environmental support items was higher for the availability of intramural sports, physical activity clubs, special transportation, interscholastic sports, and indoor facilities and lower for community partnerships, community use of facilities, and outdoor facilities. Because of differential levels of variation among the items, the application of equal weights would not be appropriate with these data. Therefore, the derived weights were applied to individual components in the calculations of the environmental support index. The sample mean for the composite environmental support index was 3.50 (\(SD = 1.33\)) with a minimum of 0.54 and a maximum of 7.05. No outliers were present at ±3 \(SD\) in the overall sample and the variable was normally distributed. The histogram of the distribution of environmental support index scores is presented as Figure 7.

\(^1\) Community partnership items loaded together, along with open gym and programs for students with disabilities. While this component loading may be indicative of the existence of some underlying connection with other community organizations and community use of school facilities, it is likely that this result may be more related to their characteristics as binary variables than true correlation.
Figure 7. Histogram with normal curve of composite environmental support index.

Community Type

Because of potential limitations with cell sizes in the study sample, and consistent with previous research (Roscigno et al., 2006), NCES categories were combined for comparison. Urban and suburban categories were collapsed. Because of the expected differences between rural fringe communities and more remote rural areas, town and rural
classifications were separated and merged dependent on degree of social isolation. The sample of schools in this study was highly-rural, with 121 schools (37.2% of the sample) being classified as rural. Ninety-six schools (29.5%) were classified as rural fringe, 43 schools (13.2%) were classified as suburban, and 65 schools (20%) were classified as urban. Examining the community locales of all middle schools in the state, 39.6% were rural, 29.5% were rural fringe, 12.5% were suburban, and 18.3% were urban, indicating the sample to be representative of actual conditions in North Carolina. Descriptive univariate comparisons on characteristics of environmental supports for extracurricular school sport and physical activity were made based on community type. The results of these analyses are presented in Table 15 below.
Table 15

Mean and Percentage Comparisons of Individual Environmental Support Variables Based on Community Type

<table>
<thead>
<tr>
<th></th>
<th>Rural</th>
<th>Rural Fringe</th>
<th>Suburban</th>
<th>Urban</th>
<th>$\chi^2$ Value</th>
<th>$\chi^2$ Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean number of interscholastic sports</td>
<td>9.83</td>
<td>11.30***</td>
<td>12.23***</td>
<td>10.92*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2.63)</td>
<td>(2.75)</td>
<td>(2.95)</td>
<td></td>
<td>(3.83)</td>
<td></td>
</tr>
<tr>
<td>Mean number of intramural sports</td>
<td>1.21</td>
<td>2.32**</td>
<td>1.37</td>
<td></td>
<td>2.51**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2.52)</td>
<td>(3.49)</td>
<td>(2.61)</td>
<td></td>
<td>(3.55)</td>
<td></td>
</tr>
<tr>
<td>Mean number of physical activity clubs</td>
<td>0.80</td>
<td>1.53**</td>
<td>1.47</td>
<td></td>
<td>1.40*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.67)</td>
<td>(1.95)</td>
<td>(2.06)</td>
<td></td>
<td>(2.08)</td>
<td></td>
</tr>
<tr>
<td>Pct. with open gym</td>
<td>.339</td>
<td>.385</td>
<td>.326</td>
<td>.308</td>
<td>4.56</td>
<td>.601</td>
</tr>
<tr>
<td>Mean number of indoor facilities</td>
<td>1.54</td>
<td>1.96***</td>
<td>1.93*</td>
<td></td>
<td>2.17***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(.847)</td>
<td>(1.04)</td>
<td>(.961)</td>
<td></td>
<td>(1.15)</td>
<td></td>
</tr>
<tr>
<td>Mean number of outdoor facilities</td>
<td>4.39</td>
<td>5.03*</td>
<td>5.26*</td>
<td>5.29*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2.04)</td>
<td>(2.02)</td>
<td>(1.81)</td>
<td></td>
<td>(2.69)</td>
<td></td>
</tr>
<tr>
<td>Pct. with special transportation</td>
<td>.347</td>
<td>.438</td>
<td>.442</td>
<td>.585</td>
<td>9.74</td>
<td>.021</td>
</tr>
<tr>
<td>Pct. with programs for students with disabilities</td>
<td>.215</td>
<td>.250</td>
<td>.186</td>
<td>.308</td>
<td>2.79</td>
<td>.425</td>
</tr>
</tbody>
</table>

Community use of facilities

<table>
<thead>
<tr>
<th></th>
<th>Rural</th>
<th>Rural Fringe</th>
<th>Suburban</th>
<th>Urban</th>
<th>$\chi^2$ Value</th>
<th>$\chi^2$ Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pct. allowing community sports teams</td>
<td>.831</td>
<td>.896</td>
<td>.791</td>
<td>.769</td>
<td>5.17</td>
<td>.160</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pct. allowing community classes</td>
<td>.198</td>
<td>.260</td>
<td>.167</td>
<td>.145</td>
<td>3.60</td>
<td>.308</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pct. allowing supervised free play</td>
<td>.304</td>
<td>.250</td>
<td>.209</td>
<td>.190</td>
<td>3.35</td>
<td>.341</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pct. allowing unsupervised free play</td>
<td>.063</td>
<td>.032</td>
<td>.073</td>
<td>.048</td>
<td>1.49</td>
<td>.685</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pct. with community partnerships</td>
<td>.818</td>
<td>.854</td>
<td>.837</td>
<td>.831</td>
<td>.508</td>
<td>.917</td>
</tr>
</tbody>
</table>

Note: Figures in parentheses are standard deviations. * indicates mean difference from rural group mean significant at $p \leq .05$ level (** $p \leq .01$; *** $p \leq .001$).
Preliminary evidence suggested that schools in rural areas offered significantly fewer interscholastic sport activities and had significantly fewer indoor and outdoor facilities for physical activity than schools in rural fringe, suburban, and urban communities. Rural schools were also less likely to offer any special transportation home for students who participated in extracurricular sport and physical activities. They also offered significantly fewer intramural sports and physical activity clubs than rural fringe and urban schools, but not suburban schools. Fewer rural schools offered extracurricular physical activity programs for students with disabilities or formed partnerships with community organizations, but these deficits were not statistically significant. Rural and rural fringe schools were also more likely than suburban and urban schools to allow community use of facilities, but these differences were also not statistically significant.

Mean comparisons of unweighted environmental support index items indicated similar patterns across community types. These comparisons are presented in Table 16. Mean comparisons of composite environmental support scores and descriptive statistics were also generated across community types. These comparisons are presented in Table 17.
Table 16

*Mean Comparisons of Environmental Support Index Items Based on Community Type*

<table>
<thead>
<tr>
<th>Item</th>
<th>Rural</th>
<th>Rural Fringe</th>
<th>Suburban</th>
<th>Urban</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interscholastic sports</td>
<td>.492</td>
<td>.565</td>
<td>.612</td>
<td>.546</td>
</tr>
<tr>
<td></td>
<td>(.132)</td>
<td>(.137)</td>
<td>(.148)</td>
<td>(.154)</td>
</tr>
<tr>
<td>Intramural sports</td>
<td>.086</td>
<td>.166</td>
<td>.098</td>
<td>.179</td>
</tr>
<tr>
<td></td>
<td>(.180)</td>
<td>(.249)</td>
<td>(.186)</td>
<td>(.253)</td>
</tr>
<tr>
<td>Physical activity clubs</td>
<td>.100</td>
<td>.191</td>
<td>.183</td>
<td>.175</td>
</tr>
<tr>
<td></td>
<td>(.208)</td>
<td>(.243)</td>
<td>(.258)</td>
<td>(.259)</td>
</tr>
<tr>
<td>Open gym</td>
<td>.35</td>
<td>.39</td>
<td>.33</td>
<td>.31</td>
</tr>
<tr>
<td>Indoor facilities</td>
<td>.256</td>
<td>.326</td>
<td>.322</td>
<td>.362</td>
</tr>
<tr>
<td></td>
<td>(.141)</td>
<td>(.173)</td>
<td>(.160)</td>
<td>(.192)</td>
</tr>
<tr>
<td>Outdoor facilities</td>
<td>.338</td>
<td>.387</td>
<td>.404</td>
<td>.407</td>
</tr>
<tr>
<td></td>
<td>(.156)</td>
<td>(.155)</td>
<td>(.140)</td>
<td>(.207)</td>
</tr>
<tr>
<td>Special transportation</td>
<td>.347</td>
<td>.438</td>
<td>.442</td>
<td>.585</td>
</tr>
<tr>
<td>Programs for students with disabilities</td>
<td>.210</td>
<td>.250</td>
<td>.190</td>
<td>.310</td>
</tr>
<tr>
<td>Community use of facilities</td>
<td>.475</td>
<td>.516</td>
<td>.465</td>
<td>.431</td>
</tr>
<tr>
<td></td>
<td>(.257)</td>
<td>(.211)</td>
<td>(.253)</td>
<td>(.232)</td>
</tr>
<tr>
<td>Community Partnerships</td>
<td>.818</td>
<td>.854</td>
<td>.837</td>
<td>.831</td>
</tr>
</tbody>
</table>

*Note:* Numbers in parentheses are standard deviations.
Table 17

*Mean Comparisons and Descriptive Statistics of Composite Environmental Support Scores Across Community Type*

<table>
<thead>
<tr>
<th>Community Type</th>
<th>Mean</th>
<th>N</th>
<th>SD</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural</td>
<td>3.10</td>
<td>121</td>
<td>1.35</td>
<td>.54</td>
<td>7.05</td>
</tr>
<tr>
<td>Rural Fringe</td>
<td>3.75</td>
<td>96</td>
<td>1.24</td>
<td>1.38</td>
<td>6.85</td>
</tr>
<tr>
<td>Suburban</td>
<td>3.55</td>
<td>43</td>
<td>1.13</td>
<td>1.62</td>
<td>6.48</td>
</tr>
<tr>
<td>Urban</td>
<td>3.85</td>
<td>65</td>
<td>1.38</td>
<td>1.28</td>
<td>6.82</td>
</tr>
<tr>
<td>Total</td>
<td>3.50</td>
<td>325</td>
<td>1.33</td>
<td>.54</td>
<td>7.05</td>
</tr>
</tbody>
</table>

Descriptive statistics indicated that, that on average, schools in this sample that were located in rural communities had lower composite environmental support scores than schools in other locations. The rural group also included the schools with the lowest and highest environmental index scores of the sample. However, the school recording the 7.05 score, along with another school recording a 6.47 score, was an outlier in the rural sub-sample at the ±2 SD threshold. Outside of these two schools (representing 1.6% of the rural sub-sample), no other rural schools recorded an environmental support index score over 6.00, with the next highest score being 5.89. In comparison, 6.25% of rural fringe schools, 2.3% of suburban schools, and 9% of urban schools had scores greater than 6.00. An examination of the two outlier schools indicated that further transformations of the variables would not improve its
normal distribution or significantly alter mean scores. Therefore, these scores were left unchanged.

Explanatory Variables

The second objective of this analysis was to determine how key institutional and community characteristics may explain geographic disparities in access to supportive environments for extracurricular sport and physical activity in North Carolina middle schools. To control for school compositional factors, measures of school enrollment, percent minority, and percent economically disadvantaged were included. All school compositional measures were obtained from the 2007-2008 North Carolina Public School Report Cards provided by the North Carolina Department of Public Instruction available at www.ncschoolreportcard.org/src. Figures were taken from NC Department of Public Instruction’s Reports of Supplemental Disaggregated State, School System (LEA) and School Performance Data for 2007-08. Whether the school was an extended elementary school (i.e., containing grades K-8) was included as a final measure of school composition.

Ecological attributes of geographically-defined (i.e., contextual place effects) are also expected to exist beyond those explained by school composition. Contextual factors traditionally refer to the physical environment, material infrastructure, and services provided to the local population (Macintyre et al., 2002). The ability to provide specific environments for health promotion, such as LTPA, is directly related to the availability of community-level economic resources (Abercrombie et al., 2008). In this case, the provision of supportive environments for LTPA and services are expected to be largely influenced by distributable
economic resources available to schools (Bernard et al., 2007; Morton, 2003). The principle determinant of accessible resources for LTPA is often the availability of public funding (Cohen et al., 2007; Lounsbery et al., 2007). One underlying concern of the current research is how contextual effects emerge on two levels. Schools and, by extension, their communities are expected to differ in their access to economic resources and social cohesion. However, resources and social cohesion at the LEA level are expected to influence overall environmental support across districts. The question remains whether place disparities emerge at the school/community or district level. To account for the differential influence of these two levels, data were collected both at the school/community and LEA level.

Explanatory variables were first examined for normal distribution. Using the criterion of ±2.00 skewness and kurtosis estimates, six variables (income inequality, median household income, community level of education, local per pupil expenditure, high school football success, and high school basketball success) were not normally distributed. For the first step of transformation of these variables, each was examined for outliers at ±3 SD. This process led to the attenuation of four outliers for income inequality, median household income, local per pupil expenditure, and high school basketball appearances to +3 SD from the mean. Five outliers for level of education were reduced to +3 SD from the mean. High school football success included 20 outliers that were reduced to +3 SD from the mean. The transformation of these outliers resulted in normal distributions for all variables at the ±2.00 skewness and kurtosis threshold. The descriptive statistics and metric descriptions of the explanatory variables for the entire sample are presented in Table 18.
Table 18

**Descriptive Statistics and Descriptions For Explanatory Variables in Total Sample (N = 325)**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Mean</th>
<th>SD</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>School size</td>
<td>Total middle school enrollment</td>
<td>612.14</td>
<td>317.31</td>
<td>27</td>
<td>1502</td>
</tr>
<tr>
<td>Pct. minority</td>
<td>Pct. of student body that identified as racial/ethnic minority</td>
<td>.400</td>
<td>.244</td>
<td>.013</td>
<td>1.00</td>
</tr>
<tr>
<td>Pct. economically disadvantaged</td>
<td>Pct. of student body receiving free or reduced lunch</td>
<td>.472</td>
<td>.169</td>
<td>.000</td>
<td>.883</td>
</tr>
<tr>
<td>Elementary school</td>
<td>School contains grades K-8 (Yes = 1)</td>
<td>.169</td>
<td>--</td>
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<td>1</td>
</tr>
<tr>
<td>Local per pupil expenditure</td>
<td>District per pupil expenditure from local sources</td>
<td>1782.17</td>
<td>600.50</td>
<td>779.02</td>
<td>3700.00</td>
</tr>
<tr>
<td>Median household income</td>
<td>Median household income in school attendance area</td>
<td>38,781</td>
<td>11,757</td>
<td>16,616</td>
<td>76,250</td>
</tr>
<tr>
<td>Income inequality</td>
<td>Gini for school district</td>
<td>.425</td>
<td>.023</td>
<td>.380</td>
<td>.500</td>
</tr>
<tr>
<td>Racial heterogeneity</td>
<td>Theil’s H for school district</td>
<td>.726</td>
<td>.222</td>
<td>.120</td>
<td>1.20</td>
</tr>
<tr>
<td>Education level</td>
<td>Pct. of population in attendance area with bachelor’s degree</td>
<td>.198</td>
<td>.143</td>
<td>.040</td>
<td>.650</td>
</tr>
<tr>
<td>Commute time</td>
<td>County mean commute time to work</td>
<td>22.72</td>
<td>4.76</td>
<td>13.70</td>
<td>43.60</td>
</tr>
<tr>
<td>HS football success</td>
<td>Appearances of parent school in regional championship since 1972</td>
<td>1.60</td>
<td>2.17</td>
<td>0</td>
<td>7</td>
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<tr>
<td>HS basketball success</td>
<td>Appearances of parent school in regional championship game since 1972</td>
<td>2.37</td>
<td>2.51</td>
<td>0</td>
<td>10</td>
</tr>
</tbody>
</table>
Mean comparisons for explanatory variables across community types were also generated. The results of this analysis are presented in Table 19.

### Table 19

<table>
<thead>
<tr>
<th>Variable</th>
<th>Rural</th>
<th>Rural Fringe</th>
<th>Suburban</th>
<th>Urban</th>
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<tbody>
<tr>
<td>School size</td>
<td>415.03</td>
<td>676.55</td>
<td>828.40</td>
<td>740.86</td>
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<tr>
<td></td>
<td>(264.97)</td>
<td>(291.00)</td>
<td>(291.52)</td>
<td>(262.10)</td>
</tr>
<tr>
<td>Pct. minority</td>
<td>.351</td>
<td>.334</td>
<td>.346</td>
<td>.623</td>
</tr>
<tr>
<td></td>
<td>(.245)</td>
<td>(.205)</td>
<td>(.176)</td>
<td>(.204)</td>
</tr>
<tr>
<td>Pct. economically disadvantaged</td>
<td>.522</td>
<td>.435</td>
<td>.393</td>
<td>.485</td>
</tr>
<tr>
<td></td>
<td>(.145)</td>
<td>(.165)</td>
<td>(.140)</td>
<td>(.203)</td>
</tr>
<tr>
<td>Elementary school</td>
<td>.314</td>
<td>.115</td>
<td>.046</td>
<td>.062</td>
</tr>
<tr>
<td></td>
<td>(--)</td>
<td>(--)</td>
<td>(--)</td>
<td>(--)</td>
</tr>
<tr>
<td>Local per pupil expenditure</td>
<td>1,514.64</td>
<td>1,758.41</td>
<td>2,018.48</td>
<td>2,158.97</td>
</tr>
<tr>
<td></td>
<td>(524.52)</td>
<td>(510.13)</td>
<td>(656.12)</td>
<td>(568.34)</td>
</tr>
<tr>
<td>Median household income</td>
<td>32,696</td>
<td>41,379</td>
<td>43,633</td>
<td>43,063</td>
</tr>
<tr>
<td></td>
<td>(5,670)</td>
<td>(10,322)</td>
<td>(12,735)</td>
<td>(16,137)</td>
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<tr>
<td>Income inequality</td>
<td>.428</td>
<td>.420</td>
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<td></td>
<td>(.026)</td>
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<td>(.018)</td>
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<td>Racial heterogeneity</td>
<td>.664</td>
<td>.699</td>
<td>.722</td>
<td>.886</td>
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<tr>
<td></td>
<td>(.242)</td>
<td>(.205)</td>
<td>(.199)</td>
<td>(.128)</td>
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<tr>
<td>Education level</td>
<td>.129</td>
<td>.187</td>
<td>.240</td>
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<td></td>
<td>(.063)</td>
<td>(.103)</td>
<td>(.166)</td>
<td>(.193)</td>
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<tr>
<td>Commute time</td>
<td>23.87</td>
<td>22.59</td>
<td>22.65</td>
<td>20.82</td>
</tr>
<tr>
<td></td>
<td>(5.73)</td>
<td>(4.26)</td>
<td>(4.54)</td>
<td>(2.54)</td>
</tr>
<tr>
<td>HS football success</td>
<td>1.52</td>
<td>1.23</td>
<td>1.33</td>
<td>2.48</td>
</tr>
<tr>
<td></td>
<td>(2.18)</td>
<td>(1.83)</td>
<td>(1.77)</td>
<td>(2.61)</td>
</tr>
<tr>
<td>HS basketball success</td>
<td>2.02</td>
<td>1.98</td>
<td>1.98</td>
<td>3.85</td>
</tr>
<tr>
<td></td>
<td>(2.05)</td>
<td>(2.38)</td>
<td>(2.69)</td>
<td>(2.85)</td>
</tr>
</tbody>
</table>

*Note:* Numbers in parentheses are standard deviations
Descriptive statistics revealed patterns of school characteristics and potential community disadvantage that might explain deficits in environmental support for extracurricular sport and physical activity in schools located in rural areas. On average, rural schools in this sample had lower enrollments than schools in more urbanized areas and were more likely to be elementary schools. Rural schools also contained higher concentrations of students with economically disadvantaged backgrounds. Rural schools were located within communities with the lowest median household incomes, lowest percentage of residents with bachelor’s degrees, and highest average commute times among the community types in this study. Rural schools’ school districts also provided the lowest levels of local per pupil expenditure in this sample. Finally, though variation among community types was relatively low, both rural and urban school districts in this sample demonstrated higher levels of income inequality. Conversely, urban schools had highest minority enrollments, highest local per pupil expenditure, and highest levels of success in high school football and boys’ basketball.

Multicollinearity Tests and Solutions. These results must be interpreted cautiously, however, for several reasons. First, because of the hierarchical nature of the data in this study, it is not possible to discern between district-level and school-level variation. Second, it is impossible to make conclusions about the explanatory power of individual predictors in relation to the dependent variable, without accounting for variance explained by other predictors. Finally, because of the clustering of schools in this study, as well as the interrelated nature of measures, some of these explanatory variables may be correlated with
each other. Thus, some of the explanatory power of these variables may be artificially influenced by the presence of high multicollinearity. To establish whether multicollinearity was present in this study, the correlation matrix among explanatory variables was examined. This matrix is presented as Table 20.

Table 20

*Correlations of Explanatory Variables to be Used to Predict Environmental Support For Extracurricular Sport and Physical Activity*

<table>
<thead>
<tr>
<th>Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. School size</td>
<td></td>
<td>1.00</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>2. Pct. Minority</td>
<td></td>
<td></td>
<td>.152</td>
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<td></td>
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</tr>
<tr>
<td>3. Pct. economically disadvantaged</td>
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<td></td>
<td></td>
<td>-.342</td>
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<td></td>
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</tr>
<tr>
<td>4. Elementary school</td>
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<td>-.533</td>
<td>-.219</td>
<td>.046</td>
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<tr>
<td>5. Local per pupil expenditure</td>
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</tr>
<tr>
<td>6. Median household income</td>
<td></td>
<td>.562</td>
<td>-.116</td>
<td>-.607</td>
<td>-.157</td>
<td>.381</td>
<td></td>
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<td>7. Income inequality</td>
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<td>-.166</td>
<td>.343</td>
<td>.309</td>
<td>.012</td>
<td>.144</td>
<td>-.210</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>8. Racial heterogeneity</td>
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<td>.700</td>
<td>.103</td>
<td>-.190</td>
<td>.165</td>
<td>.191</td>
<td>.317</td>
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<td>**</td>
<td>1.00</td>
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<tr>
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<td>-.415</td>
<td>-.149</td>
<td>.535</td>
<td>.726</td>
<td>.093</td>
<td>.312</td>
<td></td>
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<td></td>
<td>**</td>
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<td>**</td>
<td>**</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Commute time</td>
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<td>.020</td>
<td>-.112</td>
<td>-.165</td>
<td>.165</td>
<td>-.065</td>
<td>.149</td>
<td>-.247</td>
<td>-.006</td>
<td>-.089</td>
<td></td>
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</tr>
<tr>
<td></td>
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<td>**</td>
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<td>**</td>
<td>**</td>
<td></td>
<td>1.00</td>
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</tr>
<tr>
<td>11. HS football success</td>
<td></td>
<td>-.008</td>
<td>.235</td>
<td>.224</td>
<td>-.064</td>
<td>-.058</td>
<td>-.091</td>
<td>.111</td>
<td>.111</td>
<td>.050</td>
<td>-.188</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>1.00</td>
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<tr>
<td>12. HS basketball success</td>
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<td>.006</td>
<td>.251</td>
<td>.184</td>
<td>.006</td>
<td>.012</td>
<td>-.070</td>
<td>.073</td>
<td>.104</td>
<td>.020</td>
<td>.004</td>
<td>.355</td>
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<td>**</td>
<td></td>
<td></td>
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<td>1.00</td>
</tr>
</tbody>
</table>

*Note*: * Pearson correlation significant at .05 level (two-tailed); ** significant at .001 level.
Although there is no firm threshold by which to diagnose multicollinearity, a conservative approach is to use a cutoff of Pearson correlation coefficients of ± .600. Examination of the correlation matrix revealed coefficients above this threshold between Education level and Median household income (.726) and between Median household income and percent economically disadvantaged (-.607) at Level 1. Another high correlation was observed between levels for percent minority at the school level and racial heterogeneity at the district level (.700).

To reduce the presence of multicollinearity, values for median household income and percent minority were re-centered around the sample mean. This transformation made no significant improvements from the untransformed data. As a secondary test of potential effects from multicollinearity, variance inflation factors (VIF) were estimated to establish the potential degree by which standard errors associated with regression coefficients may be inflated due to the presence of multicollinearity. To estimate these coefficients, all model variables (with one-left-out indicators for community type) were entered into a straight OLS regression model. This technique required the Level 2 data to be treated as if they were attributes of individual schools. Because OLS regression models assume independent observations and therefore cannot accurately estimate models with clustered data, this model cannot provide reliable inferential regression estimates. Therefore, the results of this model are not discussed beyond collinearity diagnostics. Using a VIF threshold of 4.00 (Garson, 2009), only school percent minority demonstrated potential inflation of standard errors based on its correlations with other predictor variables (VIF = 4.584). The VIF for racial
heterogeneity was 2.827. Because the parameter estimate for percent minority at the school level was not significant ($p = .862$) and the parameter estimate for racial heterogeneity at the district level was significant ($p = .004$), and based on partial correlation coefficients with the dependent variable and $R^2$ comparisons, percent minority was dropped from this primary set of multi-level model estimates.

Although not at the 4.00 cutoff, the VIF scores for median household income (3.901) and level of education (3.484) also indicated potentially confounding effects for multicollinearity between those variables. Based on partial correlation coefficients with the dependent variable and $R^2$ comparisons, a better model fit was observed with the inclusion of median household income rather than level of education in the model. Therefore, community level of education was dropped from the primary set of multi-level model estimates.

While the decision to drop percent minority and community level of education reduces the statistical problem of multicollinearity, it does so with the loss of theoretically important measures. Although these variables are correlated, they may affect environmental support for extracurricular sport and physical activity independently at different levels. To account for all the dimensions by which different levels of school composition, contextual resources, and social functioning influence place differences in environmental support, a secondary strategy of data analysis was included in this study. To address multicollinearity without the loss of key theoretical variables, PCA was employed as an approach to reduce the data based upon underlying relational dimensions. PCA is a useful strategy for reducing multicollinearity because it partitions and reduces correlations between groups of variables.
(Land, McCall, & Cohen, 1990). The use of orthogonal varimax rotation also maximizes the correlations within components while minimizing correlations between components (Tabachnick & Fidell, 2007). Additionally, PCA may also reduce inflated standard errors caused by lower levels of multicollinearity among variables with correlations that approached the arbitrary .600 cutoff (i.e., median household income and school size).

As indicated in the theoretical model, school composition, contextual resources, and social functioning are interrelated. Therefore, the underlying relationships among these variables may also emerge through PCA estimation. PCA is more advantageous than other approaches to multicollinearity and data reduction because generated component scores and dimensions are only transformations of the raw data (Kim & Mueller, 1978). The difficulty with PCA and using component scores to test hypotheses is that their parameter estimates are not as clearly interpretable as estimates generated from raw data. Therefore, PCA and modeled component scores was used only as a secondary analysis strategy.

Of the 12 explanatory variables (community type was not included because it was the primary independent variable), 11 were initially selected for PCA. The measure of whether or not a school was an elementary school was not selected because it was a binary variable. Mean commute time was also later dropped due its very low sampling adequacy coefficient, leaving a final total of ten variables for PCA. KMO measure of sampling adequacy for the remaining variables was .630 indicating the data were acceptable for PCA. KMO measures for individual variables suggest all were acceptable for inclusion in the PCA, although percent minority demonstrated measures close to unacceptability. Using the Eigenvalue
threshold of $\lambda > 1$, three components explaining 66% of the variance in the data were extracted using PCA. The decision to keep three components was confirmed by examining the scree plot and the residual correlation matrix. However, trial runs of PCA specifying two and four components were also conducted. The results of these estimates produced unsatisfactory cross factor loadings with low interpretability. All eigenvalues and total variance explained by PCA is shown in Table 21 and the scree plot is presented in Figure 8.
**Table 21**

*Total Variance Explained by PCA for Explanatory Variables of Environmental Support of Extracurricular Sport and Physical Activity*

<table>
<thead>
<tr>
<th>Component</th>
<th>Initial Eigenvalues</th>
<th>% of Variance</th>
<th>Cumulative %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>2.963</td>
<td>29.63</td>
<td>29.63</td>
</tr>
<tr>
<td>2</td>
<td>2.435</td>
<td>24.35</td>
<td>53.98</td>
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<tr>
<td>3</td>
<td>1.197</td>
<td>11.97</td>
<td>65.96</td>
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<tr>
<td>4</td>
<td>.996</td>
<td>9.96</td>
<td>75.92</td>
</tr>
<tr>
<td>5</td>
<td>.659</td>
<td>6.59</td>
<td>82.51</td>
</tr>
<tr>
<td>6</td>
<td>.562</td>
<td>5.62</td>
<td>88.13</td>
</tr>
<tr>
<td>7</td>
<td>.472</td>
<td>4.72</td>
<td>92.85</td>
</tr>
<tr>
<td>8</td>
<td>.406</td>
<td>4.06</td>
<td>96.91</td>
</tr>
<tr>
<td>9</td>
<td>.189</td>
<td>1.89</td>
<td>98.79</td>
</tr>
<tr>
<td>10</td>
<td>.121</td>
<td>1.21</td>
<td>100.00</td>
</tr>
</tbody>
</table>

*Note: Extraction method was principal components analysis*
Orthogonal varimax rotation was chosen to simplify interpretability of component loadings after initial test of an oblique promax rotation revealed only small correlations among components (components 2 and 3 had the highest correlation at .221). Inspection of communalities, presented in Table 22 below, revealed that variables were generally well-defined by the PCA solution (Tabachnick & Fidell, 2007). Lower values for per pupil expenditure indicates some level of difference between variable and factor variance within the sample suggesting additional dimensions may be defined by per pupil expenditure.
### Table 22

*Communalities of Variables Following PCA*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Extraction Communality Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>School size</td>
<td>.544</td>
</tr>
<tr>
<td>Percent minority</td>
<td>.815</td>
</tr>
<tr>
<td>Percent economically disadvantaged</td>
<td>.760</td>
</tr>
<tr>
<td>Median household income</td>
<td>.821</td>
</tr>
<tr>
<td>Income inequality</td>
<td>.567</td>
</tr>
<tr>
<td>Racial heterogeneity</td>
<td>.687</td>
</tr>
<tr>
<td>Level of education</td>
<td>.748</td>
</tr>
<tr>
<td>Local per pupil expenditure</td>
<td>.446</td>
</tr>
<tr>
<td>HS football success</td>
<td>.605</td>
</tr>
<tr>
<td>HS basketball success</td>
<td>.603</td>
</tr>
</tbody>
</table>

*Note: Extraction method: Principal component analysis*

Using Comrey and Lee’s (1992) suggested loading cut of absolute values of .45 or higher, only one variable, percent economically disadvantaged, loaded on more than one component after rotation, but in opposite directions. The three components also demonstrated high internal consistency as evidenced by squared multiple correlation (SMC) coefficients. The rotated component solution, variance explained, and internal consistency measures are presented in Table 23.
Table 23

Rotated Component Loading Matrix for Explanatory Variables of Environmental Support for Extracurricular Sport and Physical Activity

<table>
<thead>
<tr>
<th>Variable</th>
<th>Component</th>
</tr>
</thead>
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<tr>
<td>School size</td>
<td>.715</td>
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<tr>
<td>Percent minority</td>
<td>.838</td>
</tr>
<tr>
<td>Percent economically disadvantaged</td>
<td>-.655</td>
</tr>
<tr>
<td>Median household income</td>
<td>.889</td>
</tr>
<tr>
<td>Income inequality</td>
<td>.729</td>
</tr>
<tr>
<td>Racial heterogeneity</td>
<td>.732</td>
</tr>
<tr>
<td>Level of education</td>
<td>.841</td>
</tr>
<tr>
<td>Local per pupil expenditure</td>
<td>.593</td>
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<tr>
<td>HS football success</td>
<td>.769</td>
</tr>
<tr>
<td>HS basketball success</td>
<td>.773</td>
</tr>
<tr>
<td>Rotated sums of squared loadings</td>
<td>2.937</td>
</tr>
<tr>
<td>Internal consistency (SMC)</td>
<td>.986</td>
</tr>
</tbody>
</table>

Note: Rotation method was Varimax with Kaiser normalization.
Following the extraction of the three components, the components were interpreted and named based upon their variable loadings. The purpose of interpreting components is to understand the “underlying dimension that unifies the group of variables loading on it” (Tabachnick & Fidell, 2007, p. 649). The central variables in component one were median household income and level of education. High levels of these variables were associated positively with school size and per pupil expenditure and negatively with percent economically disadvantaged. The relationship among income, education, student economic disadvantage, and per pupil expenditure seemed to measure schools’ absolute levels of available economic resources. Although level of education was initially included in this study as an antecedent characteristic of social capital, it would also be a strong indicator of schools situated in more affluent communities.

The connection between economic resources and school size initially seemed less straightforward. However, two factors may provide a link between these concepts. First, under the “No Child Left Behind” act, students who attend schools failing to meet standardized test scores are allowed to transfer to other schools within their school district (Goodwin, 2002). Students whose parents seek transfers cannot be denied enrollment into a new school, even if the school is at or above capacity. Schools in less affluent areas are more likely to be failing than schools in more affluent areas. Therefore, over time, enrollment in less affluent schools is likely to decline, while enrollment in more affluent schools is likely to increase. The second factor linking economic resources and school size is an increased likelihood that more affluent parents see larger schools as more beneficial to their children.
Larger schools are seen as being able to offer more specialized courses and more elective programs. In larger schools, many higher social class parents see opportunities to realize their self-interests by taking advantage of programs that may increase achievement gaps (i.e., specialized classes with better teachers for students identified as academically gifted) (Lay). Overall, this component seemed to be measuring the absolute economic resources of schools and districts and it was named “Economic resources.”

The central variables in component two were percent minority, racial heterogeneity, and income inequality. These variables were also positively associated with percent economically disadvantaged. These variables primarily measured social and economic inequality. On their surface, measures of racial heterogeneity or percent minority may not directly be connected with inequality. However, in the U.S., racial heterogeneity has developed within the context of power relationships tied to race and ethnicity that often inhibit the emergence of high levels of social capital. Particularly within the U.S. South, racial diversity does not occur under terms of equal social interactions. Racially heterogeneous communities often contain a historically-privileged White majority population with large concentrations of racial and ethnic minorities (Forbes, 1997). In the South, racial diversity existed primarily through a legacy of slavery and Jim Crow laws that maintained power exclusively in the hands of White citizens. After the Civil Rights Era expunged de jure racism in communities with large African American populations, Whites experienced a significant threat to their political power. Rather than cooperation, what often developed from this situation was a contentious relationship along racial lines over limited public
resources (Putnam, 2007). Therefore, this component seemed to be measuring patterns of
inequality within schools and districts and it was named “Inequality.”

High school football and basketball success loaded together on the third component.
The interpretation of this component was the most straightforward, and it was named “High
School Athletics Success.”

Scores on all three components were generated for all cases in the sample. PCA
generates component scores that reduce correlated variables into orthogonal constructs.
Component scores are estimates of the scores each school would have received if measured
directly (Tabachnick & Fidell, 2007). Component scores are standardized with a mean of
zero and a standard deviation of plus or minus one. For this study, the Bartlett method of
component score estimation was used because of its ability to estimate less biased scores than
regression approaches (Tabachnick & Fidell). One benefit of using component scores in this
study is that it collapses variables to the lowest level of analysis. Therefore, potential biased
estimates of using multi-level models with Level 2 variables and unbalanced groups may be
visible when model estimates using raw variables and model estimates using component
scores are compared. Descriptive statistics of component scores across community types are
presented in Table 24.
Table 24

Descriptive Statistics for Component Scores of Explanatory Variables Based on Community Type ($N = 325$)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Rural</th>
<th>Rural Fringe</th>
<th>Suburban</th>
<th>Urban</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic Resources</td>
<td>-.650</td>
<td>.122</td>
<td>.553</td>
<td>.664</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>(.504)</td>
<td>(.839)</td>
<td>(1.10)</td>
<td>(1.13)</td>
<td>(1.00)</td>
</tr>
<tr>
<td>Inequality</td>
<td>-.075</td>
<td>-.285</td>
<td>-.140</td>
<td>.654</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>(.874)</td>
<td>(.874)</td>
<td>(.834)</td>
<td>(.770)</td>
<td>(1.00)</td>
</tr>
<tr>
<td>H.S. Athletic Success</td>
<td>-.175</td>
<td>-.119</td>
<td>-.151</td>
<td>.602</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>(.886)</td>
<td>(.875)</td>
<td>(.931)</td>
<td>(1.19)</td>
<td>(1.00)</td>
</tr>
</tbody>
</table>

Note: Figures in parentheses are standard deviations. Extraction Method: Principal Components Analysis. Estimation Method: Bartlett

Overall, rural schools demonstrated the lowest levels of economic resources in the sample. In fact, on average rural schools was the only group to record a mean component score below the sample mean. Urban schools demonstrated the highest levels of economic resources, inequality, and high school athletic success. The next step of the analysis plan was to develop multi-level models to predict school environmental support for extracurricular sport and physical activity. The next section describes the results from this process.

Multi-Level Models

Primary Analysis. To answer the research questions of this study, a series of two-level hierarchical linear random effects models were estimated to predict environmental support for extracurricular school sport and physical activity ($ES$). These models expressed the dependent variable, environmental support of school $i$ in district $j$ ($ES_{ij}$) using two linked models: First-level models were estimated for individual schools and second-level models
estimated for school districts. Contextual resources and social functioning at the district level are expected to influence spatial differentiation in schools’ levels of environmental support. Therefore, school district was entered as a random effect into all models. Due to the data limitations, namely the potential bias produced by single-school districts, all other explanatory variables were entered as fixed effects. Because the random effect would be constant across all models, maximum likelihood was chosen instead of restricted maximum likelihood to estimate models. For the initial multi-level model, an unconditional means model was estimated, to examine variation in $ES$ across school districts. The unconditional model, which is effectively a one-way random effects ANOVA model, includes only the intercept (the random effect of Level 2 grouping) and establishes whether differences in the outcome variable exist across groups (Singer, 1998). This model can be written as follows:

$Level\ 1\quad ES_{ij} = \beta_{0j} + r_{ij}$

$Level\ 2\quad \beta_{0j} = \gamma_{00} + u_{0j}$

In the above equation, $\gamma_{00}$ represents the fixed effects intercept. The Level 2 error term $u_{0j}$ represents the unique adjustment of each school district on the value of the intercept for this model and $r_{ij}$ represents the Level 1 error term attributable to each school. If the random effect for school district in this model was statistically different from zero, it would suggest that $ES$ varies across Level 2 clusters. In other words, levels of environmental support for extracurricular sport and physical activity may be dependent on school district level factors. Following the examination of the unconditional means model, models were
estimated that included community locale and Level-1 and Level-2 explanatory variables. First, variables measuring school composition, contextual resources, and social functioning were entered in groups separately. Next, a full theoretical model was estimated. Finally, a parsimonious model excluding non-significant explanatory variables was estimated.

Nested models were compared for model fit using -2 Log Likelihood (Deviance), Akaike Information Criterion (AIC), and Schwarz's Bayesian Criterion (BIC). Deviance measures are sensitive to increased parameters. Both AIC and BIC penalize deviance scores for increased model parameters although BIC is more restrictive. Differences in goodness of fit coefficients between nested models have a $\chi^2$ distribution with degrees of freedom of the difference in number of model parameters. As a measure of effect size, $\eta^2$ was estimated for Level-1 and Level-2 portions of each model in comparison to the unconditional means model (Tabachnick & Fidell, 2007). The results of model estimations are presented in Table 25.
Table 25

Hierarchical Linear Random Intercept Models Predicting Environmental Support from Community Type (Level 1 N = 325; Level 2 N = 97)

<table>
<thead>
<tr>
<th>Models</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
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</thead>
<tbody>
<tr>
<td>Fixed Effects</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>3.43***</td>
<td>3.73***</td>
<td>4.33***</td>
<td>2.19***</td>
<td>4.69***</td>
<td>3.01</td>
<td>3.42***</td>
</tr>
<tr>
<td>(0.096)</td>
<td>(0.189)</td>
<td>(0.399)</td>
<td>(0.402)</td>
<td>(1.67)</td>
<td>(1.67)</td>
<td>(0.065)</td>
<td></td>
</tr>
<tr>
<td>Community Type</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Rural</td>
<td>-0.563*</td>
<td>-0.662**</td>
<td>-0.267</td>
<td>-0.475</td>
<td>-0.475</td>
<td>-0.295</td>
<td>-0.386</td>
</tr>
<tr>
<td>(0.224)</td>
<td>(0.241)</td>
<td>(0.226)</td>
<td>(0.254)</td>
<td>(0.248)</td>
<td>(0.224)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Rural Fringe</td>
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<td>-0.265</td>
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<tr>
<td>(0.212)</td>
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</tr>
<tr>
<td>3. Suburban</td>
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<td>-0.559*</td>
<td>-0.325</td>
<td>-0.322</td>
<td>-0.459</td>
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<tr>
<td>(0.247)</td>
<td>(0.258)</td>
<td>(0.243)</td>
<td>(0.255)</td>
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<tr>
<td>4. Urban</td>
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<tr>
<td>School Size</td>
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<tr>
<td></td>
<td>2E-04</td>
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<td>Disadvantaged</td>
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<td>Elementary School (1 = Yes)</td>
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<td>Local Per Pupil Expenditure (in $1000)</td>
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<td></td>
<td>.454**</td>
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<td>Median Household Income (in $1000)</td>
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<tr>
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<td>.020*</td>
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<td>-.013</td>
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<td>-.018</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>(.016)</td>
<td></td>
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<td></td>
<td>(.016)</td>
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</tr>
<tr>
<td>H.S. Football Success</td>
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<td></td>
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<td></td>
</tr>
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<td></td>
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</tr>
<tr>
<td>H.S. Basketball Success</td>
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<td></td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
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<td>.002</td>
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<td></td>
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<td>(.029)</td>
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</tbody>
</table>
Table 25 Continued

<table>
<thead>
<tr>
<th>Variance Components</th>
<th>L2 - District-Level ($\tau_{00}$)</th>
<th>.355** (1.120)</th>
<th>.272** (.109)</th>
<th>.189* (.089)</th>
<th>.196* (.093)</th>
<th>.192* (.086)</th>
<th>.109* (.066)</th>
<th>.105 (.065)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pct. L2 variance explained ($\eta^2$)</td>
<td>23.4% 46.8% 44.8% 45.9% 69.3% 70.4%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>L1 - School-Level ($\sigma^2$)</th>
<th>1.39*** (.125)</th>
<th>1.38*** (.125)</th>
<th>1.37*** (.121)</th>
<th>1.35*** (.121)</th>
<th>1.32*** (.117)</th>
<th>1.30*** (.113)</th>
<th>1.31*** (.113)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pct. L1 variance explained ($\eta^2$)</td>
<td>0.8% 1.5% 2.9% 5.1% 6.5% 5.6%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Goodness of Fit**

| Deviance | 1082.0 | 1072.1 | 1058.0 | 1054.6 | 1046.8 | 1029.2 | 1031.2 |
| AIC      | 1088.0 | 1084.1 | 1078.0 | 1070.6 | 1070.8 | 1061.2 | 1051.2 |
| BIC      | 1095.7 | 1099.6 | 1103.7 | 1101.2 | 1101.7 | 1102.4 | 1077.0 |

*Note: Standard errors in parentheses. Level 2 independent variables represented in italics. Estimation method: Maximum likelihood. * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

aUnconditional Model
bUrban was used as the reference category for community type
cPct. Minority and Level of Education left out of full theoretical model due to potential bias of multicollinearity

The results of Model 1, the unconditional means model, indicated that variance components between schools and between school districts were both statistically significant. This result suggested that both schools and school districts differ in average $ES$ score. The interclass correlation between $\tau_{00}$ and $\sigma^2$ ($\rho = .203$) signified that approximately 20% of the variance in $ES$ among schools in this sample is due to differences between school districts. Thus, Model 1 implied that clustering of schools would likely produce misleading results if estimated in OLS regression.

**RQ1: Do differences in supportive environments for extracurricular physical activity exist based upon community location?** In Model 2, the categorical variable community type was entered into the model, using Urban as the reference category. The fixed effects estimates of Model 2 indicated that, in this sample, schools in rural communities had significantly lower $ES$ scores than schools in urban areas. There were no significant
differences in $ES$ scores between rural fringe or suburban schools and urban schools in this sample. Individual model estimates for average school $ES$ by community location are written as follows:

Rural Schools: \[ ES_{ij} = 3.17 + [u_0 + r_{ij}] \]

Rural Fringe Schools: \[ ES_{ij} = 3.69 + [u_0 + r_{ij}] \]

Suburban Schools: \[ ES_{ij} = 3.43 + [u_0 + r_{ij}] \]

Urban Schools: \[ ES_{ij} = 3.73 + [u_0 + r_{ij}] \]

Model 2 $\eta^2$ also indicated that, in this sample, the introduction of community type into the model explained 23.4% of variance between school districts and less than 1% of variance between schools. This result suggested that place disparities in $ES$ related to rural and urban differences may be more related to differences in school districts rather than in individual schools. Model fit statistics confirmed that the model with community type was a better fit to the data than the unconditional means model (AIC $\chi^2 = 3.9$, 1 df, $p = .049$). In the next step of model analysis, groups of variables measuring school composition, contextual resources, and social functioning were entered separately to determine the degree to which differences in $ES$ based upon community type could be explained by these variables.

**RQ2: Are spatial differences explained by compositional characteristics of school populations?** Model 3 indicated that percent minority and an elementary school configuration were both associated with lower $ES$ scores among schools in this sample. Neither school size nor percent economically disadvantaged were significant predictors of $ES$. In relation to community type, controlling for school composition not only failed to
explain away differences in \( ES \) between community types, it actually inflated community differences. One unanticipated result was that \( ES \) scores for suburban schools were significantly lower than urban schools when controlling for school composition.

**RQ3**: What aspects of community contextual resources at the district level and community level influence environmental support for extracurricular physical activity? In Model 4, both local per pupil expenditure at the district level and median household income at the school level were associated with higher \( ES \) scores. Model fit analysis of Model 4 indicated a better fit to these data that Model 3 which included school-level compositional factors. The introduction of contextual resources variables into the regression model explained away significant differences in \( ES \) scores independently attributable to community location.

**RQ4**: What aspects of community collective social functioning influence environmental support for school extracurricular physical activity? In Model 5, only racial heterogeneity at the district level and level of education at the school level were significant predictors of \( ES \) scores. Income inequality, commute time, high school football success, and high school basketball success were all non-significant in the model. Both Model 4 and Model 5 fit the data nearly equally as well. The introduction of social functioning variables also seemed to explain more of the variance between individual schools. Although upon initial examination of fixed effects estimates contextual resources seemed to explain more of the rural deficits of \( ES \), social functioning also independently reduced differences in \( ES \) between rural and urban areas. Models that are fitted without theoretically relevant variables
are subject to spurious estimates that may inflate the relationship between variables (Garson, 2009). Therefore, the full theoretical model was examined to determine how explanatory variable predicted ES while controlling for all other theoretical variables.

**RQ5:** How do school composition, community context, and collective social functioning combine to predict place disparities in access to supportive school environments? For the full theoretical model (Model 6), community type and all explanatory variables except percent minority and level of education were included in the model. Model 6 was generally a better fit to these data than the unconditional means model (AIC $\chi^2 = 26.8, 11 \text{ df}, p = .005$) and all previously estimated nested models. Model 6 $\eta^2$ coefficients also indicated that when including all explanatory variables into the multi-level model, the model estimate explained 69.3% of variance between school districts and 6.5% of variance between schools in this sample. Although this estimate is expected to be inflated due to the presence of school districts with only one school, thus suppressing within group estimates, the results indicate that measures within these models performed better at capturing variance between school districts rather than between schools.

In Model 6, differences in ES based on community type were not significant, although the deficit in suburban schools compared to urban schools approaches statistical significance at the .05 $\alpha$ level ($t = -1.82, p = .07$). Among explanatory variables, elementary school configuration, local per pupil expenditure, median household income, and racial heterogeneity were significantly associated with school ES scores. Models including within-level and cross-level interactions were also estimated yielding no significant results. A final
parsimonious model (Model 7) was fit to evaluate the significant predictors and community
type. Goodness of fit estimates for Model 7 did not differ significantly from Model 6 (AIC
\( \chi^2 = 10, 4 \text{ df}, p = .125 \)), indicating that the parsimonious model fit the data as well as the full
theoretical model. Fixed effects estimates in Model 7 showed that although this deficit
approached statistical significance \( t = -1.73, p = .09 \), rural school deficits in \( ES \) could be
explained by other variables in the model. However, in the estimation of Model 7,
differences in \( ES \) between suburban and urban schools was now statistically significant \( t = -
2.09, p = .038 \).

Model 7 \( \eta^2 \) coefficients indicated that the model explained 70.4% of variance between
school districts and 5.6% of variance between schools in this sample. As a measure of
overall model effect size, pseudo-R\(^2\) was calculated at .189 for Model 7. Although it
provides some insight into how well the model performed in explaining variance, this
statistic is only an approximation and not directly comparable to R\(^2\) in OLS regression.
Interestingly, in Model 7 \( \tau_{00} \) was no longer statistically significant; indicating that, after
controlling for predictor variables in the model, variance between school districts was no
longer greater than would be expected by chance. Because the variables in Model 7
significantly reduced the Level 2 variance, the model was estimated in OLS regression to
compare patterns within the model. Overall, the model performed similarly. The only
substantial differences in the multi-level model estimated with maximum likelihood and the
OLS model was that the reduced \( ES \) scores predicted by the rural indicator more closely
approached statistically significance \( t = -1.946, p = .054 \) in the OLS model. This result was
not unexpected considering the influence of district-level factors in explaining rural deficits, as suggested by the multi-level models.

In Model 7, the residual or school-level error variance ($\sigma^2$) remained significant. That estimate, along with the model only explaining 5.6% of school-level variance indicated the model could be substantially improved with better school-level measures. Similarly, although this model seems to effectively predict how disparities in $ES$ may emerge between rural and urban areas, it fails to account for the unexpected deficits in $ES$ for suburban schools in this sample. Specifically, as model fit improved and associations between rural location and low $ES$ were substantially explained away by the introduction of model parameters, unexplained association between suburban location and low $ES$ increased. One potential reason for this result is that rural deficits may be better explained by between-district factors and suburban deficits may be better explained at the school-level.

Examination of the Type III tests of fixed effects for Model 7 showed that controlling for all other variables in the model, on average, schools in this sample configured as extended elementary schools and located in racially heterogeneous school districts had less environmental support for extracurricular sport and physical activity. Conversely, schools in this sample located in districts with high local per pupil expenditure and within communities with residents with higher median household incomes demonstrated higher levels of environmental support for extracurricular sport and physical activity. Based on evaluation of $F$ values, racial heterogeneity at the district level was the most important predictor of $ES$ in this sample followed by local per pupil expenditure, elementary school configuration, and
median household income. Based on Model 7 estimates, eight separate models for these data (one for each community type by elementary school) were written as follows:

Rural

Elem.: \[ ES_{ij} = 2.46 + 0.469(\text{PPE}/1000) + 0.017(\text{MHI}/1000) - 1.53(\text{RACEHET}) + [u_0 + r_{ij}] \]

Non-Elem.: \[ ES_{ij} = 3.03 + 0.469(\text{PPE}/1000) + 0.017(\text{MHI}/1000) - 1.53(\text{RACEHET}) + [u_0 + r_{ij}] \]

Rural Fringe

Elem.: \[ ES_{ij} = 2.74 + 0.469(\text{PPE}/1000) + 0.017(\text{MHI}/1000) - 1.53(\text{RACEHET}) + [u_0 + r_{ij}] \]

Non-Elem.: \[ ES_{ij} = 3.31 + 0.469(\text{PPE}/1000) + 0.017(\text{MHI}/1000) - 1.53(\text{RACEHET}) + [u_0 + r_{ij}] \]

Suburban

Elem.: \[ ES_{ij} = 2.35 + 0.469(\text{PPE}/1000) + 0.017(\text{MHI}/1000) - 1.53(\text{RACEHET}) + [u_0 + r_{ij}] \]

Non-Elem.: \[ ES_{ij} = 2.92 + 0.469(\text{PPE}/1000) + 0.017(\text{MHI}/1000) - 1.53(\text{RACEHET}) + [u_0 + r_{ij}] \]

Urban

Elem.: \[ ES_{ij} = 2.85 + 0.469(\text{PPE}/1000) + 0.017(\text{MHI}/1000) - 1.53(\text{RACEHET}) + [u_0 + r_{ij}] \]

Non-Elem.: \[ ES_{ij} = 3.42 + 0.469(\text{PPE}/1000) + 0.017(\text{MHI}/1000) - 1.53(\text{RACEHET}) + [u_0 + r_{ij}] \]

Considering the non-significance of the component associated with error variance between school districts, the estimated models above essentially represent fixed effects models with school-level residual error. Thus, the intercepts indicated that when other variables are held constant, the only significant unexplained deficits in $ES$ related to community type in this sample are in suburban schools. However, recall from earlier in the chapter (Table 19), over 30% of all middle schools in rural areas and fewer than 5% of suburban middle schools were configured as extended elementary schools. Thus a
substantial minority of students attending rural middle schools may be doubly disadvantaged by attending schools that are also extended elementary schools. Conversely, nearly all suburban middle schools are not extended elementary schools. Therefore, considering these school characteristics, and based on the estimates of intercepts in Model 7, schools in rural and suburban communities appear to be similarly disadvantaged in their levels of environmental support for extracurricular sport and physical activity.

Secondary Analysis. As indicated earlier in this chapter, to address potential issues of multicollinearity without the loss of key theoretical variables, PCA was employed as an approach to reduce the data based upon underlying relational dimensions. The results of multi-level model estimates using component scores rather than individual variables is presented in Table 26. Model 8 represents the full model with all components and variables. Model 9 represents the parsimonious model.
### Table 26

*Hierarchical Linear Random Intercept Models Predicting Environmental Support from Community Type and Principal Components of Explanatory Variables (Level 1 N = 325; Level 2 N = 97)*

<table>
<thead>
<tr>
<th>Fixed Effects</th>
<th>Models</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1a</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Intercept</td>
<td></td>
<td>3.43***</td>
<td>3.73***</td>
<td>4.38***</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(.096)</td>
<td>(.189)</td>
<td>(.365)</td>
</tr>
<tr>
<td>Community Type</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Rural</td>
<td></td>
<td>-.563*</td>
<td>-.345</td>
<td>-.376</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(.224)</td>
<td>(.255)</td>
<td>(.238)</td>
</tr>
<tr>
<td>2. Rural Fringe</td>
<td></td>
<td>-.043</td>
<td>-.101</td>
<td>-.093</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(.212)</td>
<td>(.228)</td>
<td>(.216)</td>
</tr>
<tr>
<td>3. Suburban</td>
<td></td>
<td>-.303</td>
<td>-.440</td>
<td>-.432</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(.247)</td>
<td>(.255)</td>
<td>(.246)</td>
</tr>
<tr>
<td>4. Urbanb</td>
<td></td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Resources (Component 1)</td>
<td></td>
<td>.240*</td>
<td>.235*</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(.093)</td>
<td>(.092)</td>
<td></td>
</tr>
<tr>
<td>Inequality (Component 2)</td>
<td></td>
<td>-.208*</td>
<td>-.181*</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(.082)</td>
<td>(.082)</td>
<td></td>
</tr>
<tr>
<td>H.S. Athletic Success (Component 3)</td>
<td></td>
<td>-.075</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(.074)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commute Time</td>
<td></td>
<td>-.027</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(.016)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elementary School (1 = Yes)</td>
<td></td>
<td>- .389</td>
<td>-.414*</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(.209)</td>
<td>(.207)</td>
<td></td>
</tr>
</tbody>
</table>

### Variance Components

<table>
<thead>
<tr>
<th>L2 - District-Level (τ00)</th>
<th>1a</th>
<th>2</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.355**</td>
<td>.272**</td>
<td>.173*</td>
<td>.182*</td>
</tr>
<tr>
<td></td>
<td>(.120)</td>
<td>(.109)</td>
<td>(.088)</td>
<td>(.089)</td>
</tr>
<tr>
<td>Pct. L2 variance explained (η2)</td>
<td>23.4%</td>
<td>51.3%</td>
<td>48.7%</td>
<td></td>
</tr>
<tr>
<td>L1 - School-Level (σ2)</td>
<td>1.39***</td>
<td>1.38***</td>
<td>1.34***</td>
<td>1.36***</td>
</tr>
<tr>
<td></td>
<td>(.125)</td>
<td>(.125)</td>
<td>(.120)</td>
<td>(.121)</td>
</tr>
<tr>
<td>Pct. L1 variance explained (η2)</td>
<td>0.8%</td>
<td>3.6%</td>
<td>2.2%</td>
<td></td>
</tr>
</tbody>
</table>

### Goodness of Fit

| Deviance    | 1082.0 | 1072.1 | 1050.3 | 1054.4 |
| AIC         | 1088.0 | 1084.1 | 1072.3 | 1072.4 |
| BIC         | 1095.7 | 1099.6 | 1100.6 | 1095.6 |

*Note:* Standard errors in parentheses. Estimation method: Maximum likelihood. *p ≤ .05, **p ≤ .01, ***p ≤ .001

*bUnconditional model

*bUrban was used as the reference category for community type
Models using component scores essentially told the same story as models using individual variables. Differences in ES by community location were largely attributable to differences in resources and patterns of inequality. Schools with extended elementary school configurations also demonstrated significantly lower levels of ES. However, models using component scores did not perform as well with these data as models using individual variables. After evaluating both sets of models’ goodness of fit estimates and variance components, it was determined that any benefits of reducing multicollinearity realized by using component scores was undermined by poor model performance. Therefore, these models were not analyzed any further in this study.

Chapter Summary

In this chapter, I presented the detailed results of the data analysis. This review included descriptive statistics of dependent variable items and described the process by which I developed a composite environmental support index. Part of this process was an outline of the principal components analysis used to weight index items. I also described measures of community type which served as the independent variable of interest in this study. I presented mean comparisons of individual environmental support items and composite environmental support index scores across community types. I then described the explanatory variables expected to influence community differences in environmental support and compared levels of these variables across community types. After presenting these variables, I explained the strategies I used to reduce potential multicollinearity among independent variables. Finally, I outlined the primary empirical findings of this study by
presenting the results of multi-level model estimations. In the next chapter, I will present a summary of these findings in relation to the research questions and hypotheses guiding this study. I will also discuss the interpretations and the significance of these findings based upon previous empirical and theoretical research. I will discuss the major limitations of this study and present recommendations for future research in this area. Finally, I will present recommendations for practice and policy as well as conclusions.
CHAPTER 5: DISCUSSION

The purpose of this study was to determine whether local differences existed in access to supportive environments for extracurricular school physical activity for middle-school aged adolescents in North Carolina. It also examined key institutional and community systems that may influence the provision of LTPA opportunities. This study used Macintyre’s (2000) deprivation amplification model as a conceptual framework to examine differences in supportive environments for LTPA in middle schools. This study demonstrated that disparities in access to supportive environments exist between geographic areas in the state of North Carolina and could provide justification for targeted investments in school facilities, equipment, personnel, and programming to promote adolescent physical activity. The units of comparative analysis for this study were schools and their communities. Schools were clustered in school districts and therefore my analyses incorporated two levels. Through the use of multi-level modeling, I examined how contextual place disparities emerge at the school and community level as well as school district level.

In this chapter, I will discuss and interpret the findings of this study. The chapter is organized into the following sections: summary of findings related to research questions and hypotheses, interpretations of findings, research limitations, significance of findings, recommendations for research and practice, and conclusions.
Summary of Findings

The purpose of this section is to summarize the findings of this study in relation to the previously stated research questions and hypotheses.

Relationship between community location and supportive environments for extracurricular physical activity in middle schools. My first research question asked whether differences in supportive environments existed based upon community location. It was hypothesized that differences in supportive environments for extracurricular physical activity in middle schools would vary based upon community type with schools located in rural communities having less supportive environments than schools located in urban or suburban communities. This hypothesis was partially supported by the research findings. Personnel in rural distant and remote schools reported the lowest levels of environmental support among all community types in both univariate and multivariate estimates.

Overall, rural schools did exhibit lower levels of environmental support for extracurricular physical activity, particularly in comparison to urban schools in this sample. Rural schools ranked lowest or nearly lowest on eight of the ten environmental support characteristics used in this study. Rural schools demonstrated the lowest average number of interscholastic sports, intramural spurts, and physical activity clubs offered. Rural school personnel also reported the lowest numbers of indoor and outdoor facilities. Additionally, rural schools were less likely than those in other community types to offer special transportation to home for students who wished to participate in extracurricular sport or physical activities. However, some counter-intuitive findings were observed in this study in
relationship to the first research question. Specifically, the levels of environmental support found in rural fringe and suburban schools were unexpected. Rural fringe schools demonstrated similar levels of environmental support as urban schools, which were the highest in this sample. Rural fringe schools had significantly more indoor and outdoor facilities than rural distant or remote schools. Rural fringe schools were also more likely than rural or suburban schools to offer intramural sports, physical activity clubs, open gym, programs for students with disabilities, allow community use of facilities, and partner with community organizations. As surprising were the deficits in environmental support demonstrated by suburban schools within this sample. Suburban schools were expected to have substantially higher levels of environmental support than were observed in this sample. It should be noted that suburban schools exhibited similar numbers of interscholastic sports as well as indoor and outdoor facilities as rural fringe and urban schools. However, suburban schools were similar to rural schools in their offerings of intramurals and physical activity clubs and programs for students with disabilities.

Relationship between school population characteristics and geographic differences in environmental support for extracurricular physical activity. My second research question asked whether spatial differences in environmental support could be explained by compositional characteristics of school populations. It was hypothesized that spatial differences in supportive environments for LTPA would be moderated by school compositional characteristics. Schools with higher concentrations of minority and low-SES students, smaller schools, and extended elementary schools were expected to have less
supportive environments. This hypothesis was only partially supported by the research findings in this study.

Somewhat contrary to the findings of previous researchers in this area (e.g., see Cohen et al., 2007; Fejgin, 1994; Johnston et al., 2007), the percentage of the school’s population identified as economically disadvantaged had no effect on environmental support, after controlling for community and other compositional factors. However, like Johnston, Delva and Murphy, this study found a significant negative relationship between a school’s percent minority and environmental support. As indicated in the previous chapter, district-level racial heterogeneity strongly influences school-level minority composition and may be more strongly associated with environmental support. Therefore, caution should be used when attempting to interpret the relationship between percent minority and environmental support. It appeared that, in this sample, racial patterns at the district level, rather than necessarily at the school level, were more influential in determining levels of environmental support. Nevertheless, it is noteworthy that percent minority rather than percent economically disadvantaged was significantly related to the dependent variable. On average, over 50% of the student population in rural schools was designated as economically disadvantaged. However, the effect of high concentrations of economically disadvantaged students did not appear to independently moderate rural deficits of environmental support. Conversely, having high concentration of minority students was independently associated with low environmental support. In contrast to Cohen and Tompkins (2004), school size in this sample was unrelated to environmental support, after controlling for other variables in
the model. This finding may be influenced by the moderate correlation between school enrollment and its configuration as an extended elementary school ($r = -.533$). Having an elementary school structure was significantly associated with lower environmental support. Thus, the relationship between smaller schools and lower environmental support for extracurricular physical activity seemed to be moderated by school structure.

It was expected that controlling for school compositional factors would explain away some of the community differences in environmental support. However, the opposite was observed in model estimates. Controlling for school-level composition and characteristics in the model increased estimated fixed effects for community locale. The estimated coefficient for suburban location became statistically significant. Because school composition and characteristics were all Level 1 (school/community) variables, the observed effects indicated that community disparities in environmental support occurred principally at the district level in this sample. This result further indicated that the effect of school compositional characteristics on environmental support may vary little across community types.

*Relationship of community contextual resources and geographic differences in environmental support for extracurricular physical activity.* My third research question asked what aspects of community contextual resources (i.e., economic base) both at the district-level and school-level influenced environmental support. It was hypothesized that schools located in districts and communities with more economic resources would have higher levels of environmental support. This hypothesis was supported by the research findings. Both local per pupil expenditure at the district-level and median household income
at the school/community-level were positively associated with higher levels of environmental support when controlling for all other predictors. Although district-level resources were more important to predicting environmental support, this result indicated the presence of some multi-level effect of economic resources. That is, schools located within more affluent communities may be able to draw upon some higher level of revenue from other sources to supplement resources allocated at the district level for extracurricular physical activity. Overall, district-level per pupil expenditure appeared to be a large moderator of geographic variation in environmental support for extracurricular physical activity in middle schools in this sample. After entering contextual economic resources into the multi-level model including community type, estimates of independent effects of community location predicting ES were no longer statistically significant. That is, differences in contextual economic resources between communities explained away differences in environmental support related to community locale.

_Relationship of collective social functioning and geographic differences in environmental support for extracurricular physical activity._ My fourth research question asked what aspects of collective social functioning or social cohesion influence environmental support for extracurricular physical activity in middle schools. It was hypothesized that schools located in community and districts that had higher levels of collective factors would also have higher levels of environmental support. This hypothesis was only partially supported. Among the social cohesion measures, only racial heterogeneity at the district-level was significantly associated with levels of environmental support.
Although school/community-level education level was also a significant predictor, it was unclear whether its effect was due to its close correlation with median household income and was capturing an affect of community economic resources rather than social cohesion. Similar to school-level compositional measures of economic disadvantage, district-level income inequality had virtually no independent effect on environmental support. Commute time was not significant when controlling for all other predictors in the model. Similarly, measures of high school athletic success were also not significant.

As expected, like measures of economic resources, the introduction of social functioning measures also explained away geographic differences in environmental support. The differences in relationships between racial heterogeneity and income inequality were somewhat unanticipated. In the U.S. the link between racial diversity and income inequality is often correlated (Sampson & Groves, 1989; Sampson et al., 1997), however the polarizing effect of racialized inequality may be greater than social class inequality. Racial heterogeneity may undermine social functioning in the South more than income inequality based upon unequal social interactions and power relationships that are uniquely tied to race (Forbes, 1997; Glaser, 1994; M. C. Taylor, 1998). Additionally, rural schools and urban schools in this sample were all located within school districts with similar levels of income inequality compared to other predictors. This effect may have obscured variance predicted by income inequality alone.
Relationship of combined compositional characteristics, contextual resources, and collective social functioning on geographic differences in environmental support for extracurricular physical activity. My final research question asked how school composition, contextual economic resources, and collective social functioning combined to predict place disparities in supportive environments. Although this question was largely exploratory, it was hypothesized that absolute economic resources would be the most substantial moderator of geographic variance in environmental support, but that social functioning would also have a large influence followed by school composition. This hypothesis was generally supported, but only through a few specific measures.

Contextual economic resources as a whole largely explained rural disadvantage in environmental support for extracurricular physical activity in middle schools. Rural schools simply had the lowest amounts of community-level and district-level revenue streams from which to draw. In part, this finding explains comments made by school personnel in open-ended survey questions that asked about perceived barriers to providing broader extracurricular physical activity programming. The top barriers provided by participants were lack of personnel, lack of time, lack of space/facilities, and lack of funding. Increased resources both at the community and district level could mitigate each of these items either directly or indirectly.

However, while economic resources primarily at the district level told a large portion of the story related to rural disadvantage, a clear relationship between racial heterogeneity and environmental support was also a key factor in explaining place disparities in
environmental support. In fact, after controlling for all important model variables, district-level racial heterogeneity was the most important predictor of environmental support.

Similar to per pupil expenditure, racial heterogeneity was able to independently explain away rural school disparities in environmental support. Its importance as a predictor in these models is somewhat noteworthy considering a very large percentage of rural schools in this sample, namely those in the western part of the state, were generally located in districts with very low racial heterogeneity. This characteristic suggests that rural schools located in eastern areas of the state that are both poor economically and high in minority populations were substantially lower in environmental support than other rural schools. Indeed the effect of racial heterogeneity in predicting environmental support seemed to be more salient within rural areas than in more urbanized areas.

Interpretation of Findings

The findings in this study generally supported the proposition that adolescents who live in rural areas attended schools with lower levels of environmental support for extracurricular physical activity. In this section, I will interpret these findings and discuss the reasons for deficits in environmental support found in rural areas based upon prior research. The three factors I will discuss are: Economic resources, racial heterogeneity and inequality, and school structure.

Economic resources. A key reason rural schools in this sample reported lower levels of environmental support for extracurricular physical activity was a lack of available economic resources. A community’s ability to provide environments that promote health,
such as LTPA, is often directly related to the availability of economic resources for facilities, personnel, and other supporting programs (Abercrombie et al., 2008; Bernard et al., 2007; Morton, 2003). In fact, the availability of funding is often the primary determinant of accessible supportive environments for LTPA (Cohen et al., 2007; Lounsbery et al., 2007).

In the case of extracurricular activities, increased funding might allow schools to expand programs and opportunities through capital improvements, hiring more staff or increasing stipends to encourage staff to take on added responsibilities, and providing transportation. Wechsler et al. (2000) suggested that a lower tax base and fewer capital resources in poorer areas may restrict their abilities to provide broad programming for adolescent LTPA.

Similarly, due to financial constraints, schools in more economically deprived areas may face barriers in hiring sufficient human resources to implement programs (Lounsbery et al.; Wechsler et al.). Rural areas in particular often lack sufficient human capital to organize, manage, or lead physical activities. Because of fewer funds to pay personnel, rural communities often are more likely to rely on limited volunteer or part-time support (Paluck et al.).

The U.S. educational system traditionally funds schools through local property taxes (Glickstein, 1995; Roscigno, 2000). Most importantly, local funding and control of schools, particularly in the South, has created a legacy of school inequality related to geographic location. Initially, disparate funding of schools based upon race was a deliberate policy tool of state governments in the South to maintain segregationist policies and prevent Blacks from passing Jim Crow-era literacy tests required to register to vote (Christensen, 2008; P. B.)
Following the U.S. Supreme Court’s decision in *Brown vs. the Board of Education of Topeka* and the legal dismantling of ‘separate but equal’ state policies, local funding of schools remained a powerful way of maintaining class differences in educational quality.

Like other school resources, there is evidence to suggest potential social disparities in the availability of funding for extracurricular physical activity programs in public schools (Eitzen, 1996). In a national sample of high schools, Johnston, Delva and O’Malley (2007) found a significant negative correlation between school SES and racial composition and the availability of interscholastic sports, intramural sports, and non-competitive physical activity clubs. In addition to possessing inferior facilities and equipment for physical activity, extracurricular LTPA programming in disadvantaged schools is often extremely limited by reduced budgets and lower stipends for teachers who might organize these programs (Outley & Floyd, 2002). Because of this process, schools often most in need of improved support for LTPA are the least likely to have access to the resources necessary to provide these amenities (Sallis et al., 2001).

Historically, North Carolina has been more progressive than other Southern states in trying to alleviate disparities caused by a reliance on local tax bases to fund education (Christensen, 2008). Currently, the state funds 66.9% of public education, compared to 24.4% of all school expenses that are funded from local sources (Division of School Business, 2008). However, state allocation for schools is limited to curricular programs and teacher salaries. Of the nearly $70 million spent on school-sponsored extracurricular
activities in North Carolina public schools in 2007-2008, less than 1/2 of 1% came from sources outside of the local school district. Since rural school districts in this sample had lower bases from which to draw tax revenue (Tickamyer, 2000), they may simply have fewer resources available to support extracurricular physical activity. The average local per pupil expenditure for rural schools in this sample was 14% lower than schools in the rural fringe, 25% lower than suburban schools, and 30% lower than schools located in cities.

To overcome deficits in district-level funding, schools also rely on localized fundraising efforts through parent groups, such as the Parent-Teacher Association, to enhance a school’s discretionary income. This process allows schools who can locally draw on more affluent residents to gain some advantages over schools located in less affluent communities even within the same school district (Condron & Roscigno, 2003). Financial support for schools and school programs and parent involvement is higher when the school is located in a more affluent community or urban neighborhood regardless of student population (Goldbring et al., 2006; Lauen, 2007). High income parents whose children are assigned to a public school in a poor neighborhood or community may elect to send them to a private school or enroll them in extracurricular activities outside of the school environment (Lauen). In this study, rural schools also had fewer community-level household resources from which to draw upon to complement deficits in district funding. The average median household for school attendance zones in rural areas in this sample was 21% lower than rural fringe schools, nearly 25% lower than suburban and urban schools.
Lack of funding potentially prevented many rural schools from offering more activities (e.g., intramural sports or physical activity clubs) due to the need to pay stipends to supervisory staff or purchase equipment. It is also likely that rural schools had fewer economic resources to put towards capital projects for building and maintaining athletic and physical activity facilities. Additionally, the cost of maintaining, staffing, and operating late activity busses for students participating in extracurricular activities may have been prohibitive at these schools. Conversely, there was little difference observed between rural schools and schools in other locations for environmental support factors that required little financial investment (e.g., open gym, community use of facilities, or community partnerships).

*Racial heterogeneity and inequality.* Directly interpreting how racial heterogeneity at the district level was related to lower environmental support for extracurricular physical activity in rural areas was less straightforward than economic resources. It was anticipated that racial heterogeneity, as an antecedent for social cohesion, would have some association with environmental support. In theoretical research models, racial heterogeneity was the most important predictor of environmental support, even in the presence of per pupil expenditure. The influence of racial heterogeneity on environmental support, however, was largely due to its effect within rural schools.

Collective social functioning is expected to influence a population’s capability to support common goals (i.e., social capital or social cohesion) (Coleman, 1988; Putnam, 2000; Sampson, 2001; Wilkinson, 1991). Therefore, communities with high levels of social
capital are more likely to support provisions for public goods and services at a higher level than communities with low social capital. Additionally, levels of volunteerism and other indirect support of public activities are expected to be higher in communities with high social capital. Social capital develops quicker within groups who share identity, values, and behaviors and is not necessarily inclusive (Hulse & Stone, 2007). Racially diverse communities tend to have lower levels of social capital or social cohesion compared to more racially homogenous communities, especially in the U.S. (Alesina et al., 1999; Costa & Kahn, 2003; Hallberg & Lund, 2005; Hero, 1998, 2003a, 2003b; Letki, 2008; Putnam, 2007; Sampson & Groves, 1989; Sampson et al., 1997).

Overall, racially and ethnically diverse areas suffer from a lower investment in public goods (Alesina et al., 1999; Alesina & La Ferrara, 2002). Wilson (1996) argued that Whites often view public services as exclusively benefiting members of minority populations. Because Whites may see themselves as less likely to benefit from public goods and more able to use private goods, they may favor policies that reduce taxes and subsequently support for public services. Racial heterogeneity had a much more substantial role in influencing levels of environmental support in rural areas than more urbanized areas. Similar to findings from other studies (e.g., Alesina et al., 1999; Clotfelter, 1976; Oliver & Mendelberg), it is possible that in racially heterogeneous rural areas within this sample, White power elites were unsupportive of provisions for public goods that could expand public school programs, improve public school facilities, or implement inclusive policies for extracurricular physical activity. In more homogenous rural communities, which consisted exclusively of nearly all-
White communities, the self-interests of White residents and common community interests were potentially more aligned. Follow-up exploration of data in this study revealed some patterns that support a suggested relationship between racial heterogeneity and less overall support for public goods in rural areas. A small negative association observed between racial heterogeneity and local per pupil expenditure for rural schools in this sample. This association remained when household income was controlled. Although this association was relatively small, it is noteworthy that in all other community types, racial heterogeneity was positively associated with local per pupil expenditure.

School districts in rural areas, and particularly those with high minority populations, are more susceptible to having poorly funded schools due to lower tax bases from which to draw funds and potentially from lower support for public spending programs among White residents (Roscigno, 2000). There seemed to be some evidence of a relationship between district-level racial heterogeneity and lower public investment in schools in this sample. While the absolute level of available economic resources is important, how resources are prioritized and distributed may also contribute to variation in environmental support between and within communities (Abercrombie et al., 2008; Crompton & West, 2008; McNeill et al., 2006). Additionally, considering its relatively low correlation with per pupil expenditure, racial heterogeneity in the context of social capital also seemed to play a larger, independent role in influencing levels of environmental support for LTPA in schools.

Communities that are more socially unequal and heterogeneous are less likely to create social capital or social cohesion that encourages collective action. Individuals in these
communities may be less likely to be concerned with or support larger community issues or become involved in community programs (Alesina & La Ferrara, 2002; Coffé & Geys, 2006; Putnam, 2007; Rupasingha et al., 2006; Wilkinson, 1991). When individuals within a community are willing to cooperate with each other to overcome collective problems, social capital can be a mechanism by which citizen self-interest can be reduced for the communal good (Boix & Posner, 1998; Marschall & Stolle, 2004; Putnam, 2000). Additionally, Putnam (2000) argued that communities high in social capital exhibit attitudes of trust and reciprocity. Wilkinson (1991) contends that this process fosters increased social interaction among people living in these areas. When social capital is low, communities may experience lower levels of cooperation and social interaction. In general, individuals living in racially heterogeneous areas are less connected socially, less likely to be involved in community activities, and are more likely to spend their leisure time in individualistic and sedentary leisure activities (Putnam, 2007). At the same time, communities low in social capital may be less likely to organize activities or maintain facilities designed for youth development and social control (Sampson et al., 1999).

It is conceivable that racially heterogeneous rural communities in this sample were low in social capital or social cohesion. In more homogenous communities, with high social capital, residents may have worked together to counteract low levels of services by lobbying for increased federal government grant funding or providing volunteer labor to offset deficits in human resources by building facilities, organizing carpools, or supervising activities. Schools located in these communities with higher social cohesion may also be more likely to
have active parent groups and similar organizations that can mobilize volunteers and attract private contributions, sponsors, or organize other fundraising efforts. More racially homogenous rural communities, with higher levels of social cohesion, may have been better organized and equipped to overcome their economic disadvantages and provide additional resources to enhance public school programs. Conversely, in racially heterogeneous rural communities, parents may withdraw from volunteering or participating in school-based activities. Because of prejudices and in-group biases that preference relationships within racial and ethnic groups, they may select activities for their children to participate in with children of similar racial and ethnic backgrounds outside of school. For many parents, these activities may be found in the private sector when available, through churches, or other non-profit organizations. Therefore, these parents may have less commitment to engaging in school-based activities. Additionally, lower levels of trust and reciprocity across racially heterogeneous rural communities may have reduced the willingness of schools and other organizations to form partnerships for their mutual benefit as well as discouraged opening up school resources to members of the community. Finally, lower levels of social capital may lead to lower collective motivation to participate in social activities within the community.

A separate explanation for the relationship between racial heterogeneity and a more narrow focus on interscholastic sports in rural areas may be less connected to patterns of social cohesion. For example, it is possible that along with racial heterogeneity comes with diverse cultural preferences that prioritize other programs and activities instead of extracurricular physical activity. For example, Washburne’s (1978) ethnicity thesis argues
that cultural norms, values, and socialization patterns drive ethnic and racial differences in recreation participation. Similarly, Philipp (1998) suggested that race becomes central to peer group approval of leisure activities. Sport participation and LTPA, particularly within traditional school activities, is often considered suitable for males but not necessarily for females within the cultural traditions of many racial and ethnic minority populations. Cultural factors in racially diverse communities may lead to reduced interest from some students or parents in certain types of extracurricular physical activity and therefore schools may focus solely on the activities in which other groups are interested. Extracurricular sport may be viewed in the more practical terms of social and financial mobility for members of racial minorities, rather than for health and fitness outcomes. Based upon this idea, another explanation for racial differences in sport participation relates to the perception of sport by African American boys primarily as a source of financial mobility (Early, 1991; Edwards, 1986). Black males may increasingly seek to participate exclusively in basketball and football because of what they perceive to be their opportunity to earn a college scholarship or professional contract (Bracey, 2004).

An emphasis on interscholastic sports may be more likely in rural areas due to its role as public spectacle and ties to traditional cultural ideology (Miracle & Rees, 1994). Due to the suggested additional cultural preference for competitive interscholastic sports among some minority groups, this factor may be increased in the presence of high racial heterogeneity. In racially heterogeneous rural communities extracurricular school physical activity may be seen more narrowly as exclusively comprising interscholastic sports rather
than more broadly as physical activity for health and wellness. In this sample, rural schools offered an average of five interscholastic sports for every one intramural sport or physical activity club. In rural schools located in districts identified as being low in racial heterogeneity, this ratio was 3:1. In rural schools located in districts identified as being high in racial heterogeneity, this ratio rose to a staggering 11:1. For rural fringe schools, the ratio was 2:1 for schools in low heterogeneity districts and 3:1 for schools in high heterogeneity districts. Interestingly, however, this pattern was reversed in schools located in more urbanized areas. For suburban schools, the ratio was 5:1 in low heterogeneous districts and 3:1 in high heterogeneous districts. Urban schools located in low heterogeneous districts offered three interscholastic sports for every intramural sport or physical activity club while those in districts with high heterogeneity offered two interscholastic sports for every one of these activities.

*Extended elementary school structure.* A final reason rural schools in this sample reported lower levels of environmental support for extracurricular physical activity was due to their increased likelihood of being configured as extended elementary schools in comparison to schools in more urbanized areas. Nearly 1/3 of schools in this sample were located in rural areas contained student population that ranged from kindergarten through eighth grade. In comparison, 11.5% of rural fringe schools, 4.6% of suburban schools, and 6.2% of urban schools were similarly structured. The results of this analysis indicated that being structured as an extended elementary school was associated with lower environmental support for extracurricular physical activity and that these schools were more concentrated in
It was initially hypothesized that elementary school configuration may have some effect on environmental support, based on limited research that concluded extracurricular programs, particularly for physical activity, rarely existed in elementary schools (S. M. Lee et al., 2007; Lounsbery et al., 2007). Therefore, an elementary school “mentality” was anticipated to exist in this type of schools that deemphasized all types of extracurricular programs for students in the middle grades. However, the magnitude of this effect, particularly in light of the limited significant predictors in the theoretical model, suggested a need to explore how differences in school structure might influence extracurricular programs.

Prior to school consolidation measures following desegregation in the 1960s, most small rural communities in North Carolina had their own union schools comprising grades 1 (later kindergarten) through 12. With integration, many school districts opened separate high schools to accommodate increased student population and converted many union schools into extended elementary schools by simply removing grades 9-12 from the student population. In many rural communities in this sample, currently operating K-8 schools may be holdovers from this bygone era (Reising, 2002). However, in the 1960s and 1970s, many education experts were advocating for junior high and middle school models that would better prepare adolescents for the transition from middle school to high school (Bloom, 2008). Many North Carolina school districts began opening separate school for middle grade students at that time. Many communities in North Carolina converted abandoned segregationist-era high
schools for Black students into junior highs and middle schools. Established in many ways as miniature high schools, middle schools became the dominant model for schools housing middle grades over the past quarter century.

Since the early 1990s, however, research emerged in both the youth development and education literature, with authors advocating for K-8 configurations. They argued that the elementary school structure is more developmentally appropriate for adolescents in the middle grades because by allowing students to remain in the same school it reduces drastic life changes and anxiety at a crucial time in their lives while simultaneously providing a more nurturing and less controlling environment (Eccles, Lord, & Midgely, 1991; Eccles et al., 1993; Poncelet & Meris Associates, 2004). Although research findings on the academic and developmental benefits or costs of either model have generally been inconclusive, increasingly many school districts have converted middle schools into K-8 schools (Weiss & Kipnes, 2006).

What is it about differences in these configurations that influence levels of environmental support for extracurricular physical activity? First, because middle schools are purposefully designed to prepare students for the social transition into high school, they have traditionally copied high school models that promote participation in extracurricular activities (Cuban, 1992). Second, because of the unique requirements to accommodate a wide range of grades, K-8 schools are much costlier to construct and operate (Patton, 2005). Therefore, middle schools are more likely to have amenities, such as physical activity and athletic facilities other than playgrounds (Bloom, 2008). Additionally, funds that might be
available to put towards extracurricular physical activity may be needed for curricular programs or other school operating expenses. Third, K-8 schools are perceived to be more difficult to administer than middle schools (Patton, 2005). Perhaps, based on this characteristic of K-8 schools, teachers and administrators in these schools are more limited in the time they can devote to organizing extracurricular activities. Finally, one of the stated benefits of K-8 schools is that they are more likely to focus on creating a more inclusive atmosphere throughout the school. That is, activities that include students across all grade levels are encouraged, while activities that emphasize more limited participation is discouraged (Weiss & Kipnes, 2006). From this perspective, extracurricular physical activities may be less emphasized in K-8 school. Additionally, parents of younger students in K-8 schools often have concerns when their children interact with older students in these schools (Weiss & Kipnes, 2006). Therefore, extracurricular physical activities may also be discouraged due to physical differences across grade levels.

In summary, rural schools in this sample demonstrated lower levels of environmental support for extracurricular physical activity in comparison to schools in more urbanized areas. These deficits were largely explained by a lack of economic resources at both the district-level and community-level from which to fund programs, capital improvements and staff. However, high racial heterogeneity at the district-level was also negatively associated with lower levels of environmental support in a large proportion of rural schools. It was suggested that lower community social cohesion or social capital in areas with high racial heterogeneity may reduce support for public goods, discourage volunteer involvement in
school activities, and reduce cooperation between community organizations. Additionally, socio-cultural beliefs in rural areas may emphasize interscholastic sports as the dominant form of extracurricular physical activity in public schools. Finally, because of their unique social and administrative characteristics, schools configured in a K-8 structure seem to provide fewer environmental supports for extracurricular physical activity. In this sample, these school structures were more likely to be found in rural areas. In the next section, I will outline the important limitations of this study.

Research Limitations

Findings in this study should only be interpreted in light of several conceptual and methodological limitations. Although these limitations are important, they are similar to those found in other studies. First, this study examined only a small part of the environmental factors that can influence adolescent participation in LTPA. As indicated in the literature review, a seemingly endless number of interpersonal, social, structural, and environmental factors can facilitate or constrain adolescent participation in LTPA. This study focused solely on environmental factors in school settings. The concentration on school extracurricular programs was a further limitation of this analysis. The examination of these environments ignores the other places adolescents across all community types may have available to them for physical activity. It is distinctly possible that adolescents who attend schools with lower levels of environmental support for extracurricular physical activity have an adequate provision of public parks, public recreation programs, or open areas for free play available in their communities and use them. Additionally, school policies for curricular
physical education or active transportation to and from school as part of the school environment were not studied. Taken together, these limitations suggest that these research findings present only a narrow glimpse of how school environments may affect levels of adolescent physical activity.

Second, this research assumes that higher levels of environmental support will lead to increased participation in extracurricular physical activities and that participation in these programs will make adolescents more physically active. The environmental supports used as measures in this study have been shown empirically to increase participation. Additionally, researchers have demonstrated that participation in extracurricular sport and physical activities in school programs does have a positive association with adolescent levels of LTPA. However, because the primary aim of this research was to measure levels of environmental support across the state, it was impractical to include a valid measure of participation rates or levels of physical activity in the study. Due to this limitation, it is impossible to know to what degree levels of environmental support at schools in this sample actually influenced student participation and physical activity.

Third, measures used in this study can be substantially improved to provide a better understanding of supportive environments for LTPA and place disparities. Similar to previous studies in this area, this study included no measures of quality for items in the environmental support index. Increased quantities of programs and varieties of facilities in schools have been shown to increase student participation. However, because of research constraints, there was no way to compare whether schools’ individual programs or facilities
were better or worse than those in other communities. The census approach to this study prevented objectively measuring the quality of facilities or programs and subjective measures of quality from survey participants would have likely yielded invalid results. The environmental support index was also potentially limited by not measuring all possible environmental supports for extracurricular physical activity in schools. For example, the inclusion of better measures of physical activity promotion, interactions between coaches and students, administrative commitment to physical activity and health, or perceived safety of facilities and programs may yield a more comprehensive picture of levels of environmental support. Additionally, the weighting system used for items in the composite environmental support index was data driven. Running PCA with a different set of data could possibly yield item weights that could lead to different overall findings. Ideally, weights would be determined by how each item in the index independently improves participation in extracurricular activities or increases rates of physical activity. Outside of obtaining participation or physical activity data, an alternative approach may be to have experts weight index items based on perceived importance to increasing participation or physical activity levels. Two explanatory variables used in this study were unsatisfactory. Gini coefficients used to measure income inequality were largely insensitive to small variations in income inequality found in comparisons of school districts. Though more exploratory in nature, it should also be noted that high school football and basketball success served as relatively poor measures of any cultural aspects of communities in this sample.
Fourth, there were some important limitations of the survey instrument and research design that should be discussed. The pilot testing and review process of the instrument was somewhat limited. Experienced researchers, middle school administrators, and professionals with expert knowledge of this subject area extensively reviewed the instrument. However, pilot testing was limited to one focus group and preliminary completion of the instrument by personnel at five middle schools. Based on feedback from this procedure, significant improvements were made to the instrument, however better refinement of the questionnaire may be needed.

Additionally, the online questionnaire required self-reports that were subject to biases due to memory recall, attempts at social desirability, and possible exaggeration. Although participants were informed that their responses would remain confidential, responses were not anonymous. Therefore, the desire for more socially acceptable responses may have been stronger among participants in this sample than in similar studies. The survey was adapted from another instrument conducted with similar participants in similar settings that has demonstrated acceptable levels of reliability and validity. However, due to research constraints, full examination of the reliability and validity of the specific instrument was not conducted. There were four cases where more than one personnel at a single school completed the questionnaire. In three of these cases, the school’s principal completed the questionnaire and at the other one an additional physical education teacher did so. The duplicate questionnaires were not used in the analyses. The limited number of duplicate responses prevented a full analysis for reliability of responses. However, the responses
within the four sets of participants were nearly identical in reporting the available environmental support at their schools. Similar to departures from reliability found in SHPPS 2006, divergence was most often observed in these four sets of responses on subjective items not used in this specific study.

There were also limitations related to the models specified in this analysis. Better model specification, including improved school-level variables, would reduce potential error bias in the estimated models. Additionally, as discussed earlier (see Chapter 3 for a detailed discussion), it is possible that the random intercepts models used in this study may produce biased estimated due to the imbalance of number of schools clustered within school districts in this sample.

Finally, there were limitations related to the sample used in this study. The sample was not randomly selected. The characteristics of schools not contacted to participate or those who chose not to participate in the study may have biased the sample. Approximately half the schools in this group were located in rural areas. Because of my inability to locate personnel at these schools responsible for extracurricular physical activity or their lack of interest in this study, it is reasonable to assume that many of these schools might actually have lower reported levels environmental support than those included in the sample. Therefore, the possibility exists that rural deficits in environmental support for extracurricular physical activity were underestimated in this study. Non-response analyses however indicated that no significant differences existed in the characteristics of rural schools that responded to the questionnaire and those that did not, including the non-
contacted schools. Therefore, although sample biases should be considered, the sample appears to be representative of middle schools across North Carolina.

This sample only included public schools. Although a relatively small proportion of the state’s adolescents attend private or charter schools (fewer than 10% according to U.S. Census estimates), these environments may be important to help understand some different approaches to extracurricular physical activity. In particular, private schools may have a particularly salient effect in more racially heterogeneous rural communities. Because the sample of schools in this study was not random and considering it includes schools located in a single state, the possibility of it being a unique sample is increased. Due to this characteristic and the fact variations exist in education policies across states, findings may not be generalizeable to other samples. Therefore, caution should be used when drawing inferences from this study.

Despite these limitations, the findings of this study made significant contributions to the body of knowledge. In the next section, I describe the significance of the research findings.

Significance of Findings

There are three areas in which this study makes a significant contribution to the body of knowledge. First, it provided support for and expanded the concept of deprivation amplification as a possible contributing factor for lower levels of physical activity among some segments of adolescents. Second, this study went beyond acknowledging the existence of place disparities and explored potential causes of these inequalities. Finally, this study
provided more precise definitions of community locations along the rural-urban continuum than much of the previous research. In doing so, the findings of this study revealed unanticipated patterns of spatial inequality.

**Support for deprivation amplification.** The findings of this study lend support for Macintyre’s (2000) deprivation amplification framework. Specifically, these findings suggest that institutional and environmental contexts may either amplify or reduce constraints to LTPA participation created by individual disadvantage. Community-level and district-level contextual resources were significantly associated with levels of environmental support. Thus, there seemed to be a protective effect in terms of opportunity structures for LTPA for students from economically disadvantaged backgrounds who attended schools in more affluent school districts or communities. Conversely, students who attended schools with fewer available district and community economic resources were disadvantaged in terms of the available environmental support for extracurricular physical activity.

Many researchers who have examined deprivation amplification have fallen into what Cummins (2007) has called the “local trap” (p. 355). That is, they have tended to become overly focused on comparing neighborhoods as the unit of interest within communities. Additionally, in these studies, researchers have tended to focus on large urban areas (Macintyre et al., 2008). Pearce et al. (2008) found that rural areas may be more vulnerable than urban areas for deprivation amplification, because the populations in these areas are more place-bound than more urbanized areas (Bernard et al., 2007). This research expanded the understanding of deprivation amplification by taking what Lobao (2004) advocated as a
“regional approach to spatial inequality” to compare stratification across geographic space (p. 2). Labao suggested that spatial inequality too often becomes conceptualized at two extremes, comparing either national or intra-city inequality, and significant questions can be addressed by comparing communities, counties, or states within regions. Though deprivation amplification has rarely been applied in a regional approach to spatial inequality (Hillsdon et al., 2007), it may be an effective model considering how supportive environments varied significantly across communities in this study (Abercrombie et al., 2008). This study extended this approach of comparing place disparities on a middle-range scale and furthered the knowledge of how spatial inequality affects rural areas.

**Emergence of place disparities.** The limited research exploring place disparities in access to supportive environments for LTPA has been descriptive in nature, documenting whether or not place disparities exist (Diez Roux, 2001; Ellaway et al., 2007; Estabrooks et al., 2003; Hillsdon et al., 2007; Macintyre et al., 2002). The research examining spatial inequality in the context of LTPA has traditionally focused on the relationship between compositional factors (i.e., racial composition and SES) and contextual factors, often operationalized as the quantity of facilities located nearby. There were no studies found that further explored why place disparities may exist. Crompton and West (2008) suggested that the reasons behind inequitable provisions of resources for leisure services have been largely ignored in the literature. Specifically, Bernard et al. (2007) suggested more detail was needed about the interrelatedness among compositional factors, community context, and collective social functioning in creating environments that support health behaviors.
Macintyre et al (2008) also indicated that the concept of deprivation amplification should be expanded in new ways to examine the relationship between people and place.

This study was one of the few that explored the underlying conditions of disadvantaged areas to understand how place disparities emerge. In doing so, these findings also challenged some previously held assumptions about school-based disadvantages. One key finding of this study was that rural deficits in access to supportive environments for extracurricular physical activity were not completely related to a lack of contextual economic resources. Levels of collective social functioning and school structure considerably influenced environmental support in this sample.

Most noteworthy was that, in this sample, racial heterogeneity seemed to reduce environmental support in rural schools. However, suggested patterns of school and community segregation found in more urban areas (Massey & Denton, 1993; Shapiro, 2004) were not observed in rural communities. It was not apparent that overt racially discriminatory practices or policies existed in rural school districts with high racial heterogeneity, although these cannot be ruled out by the findings. The racial composition of individual rural middle schools was generally representative of the overall population within the school district. Therefore, discriminatory practices such as those found by Condron and Roscigno (2003) where substantial variance in per pupil expenditures within local school districts corresponded to the racial and class composition of individual schools would be less likely in rural areas in this study. Schools in this study were more likely to be segregated based on race and class in more urbanized areas. However, the high levels of overall
economic resources available to schools across these districts seemed to allow those schools to overcome any potential negative effect of racial heterogeneity.

A more reasonable explanation for the finding that high levels of racial heterogeneity were negatively associated with environmental support seemed to confirm the suggested link between diversity and community social cohesion. Racially diverse communities tend to have lower levels of social capital compared to more racially homogenous communities (Costa & Kahn, 2003; Hallberg & Lund, 2005; Putnam, 2007). This study was one of the few to suggest a link between community social capital and school environments for LTPA. It was possible that lower social cohesion in rural areas with high racial heterogeneity reduced overall support for public goods such as education, and inhibited levels of parent involvement and community partnerships necessary to overcome a lack of economic resources to support extracurricular programs. Additionally, shared cultural factors attributed to rural communities and African American populations may have contributed to a prioritization of interscholastic sports at the expense of broader, more inclusive programs in these schools.

Researchers examining school-based interventions for increasing LTPA for adolescents have rarely explored how the structure of schools may affect environmental support. The findings of this study suggested an important link between school structure and supportive environments for extracurricular physical activity. Although there may be numerous academic and developmental benefits for adolescents who attend K-8 schools, they may be less likely to have access to environments that encourage LTPA at their schools.
Defining community locations. This study improved upon existing research by using more detailed and smaller-unit classifications of community types. Unlike much of the previous research, this study differentiated between rural areas that were more distant and remote from the rural fringe. There is a distinct difference between rural areas on the fringe of metropolitan areas that have experienced recent rapid growth and development and those that are more remote (LeSage & Charles, 2008). With the housing and development boom between the 1980s and middle part of the first decade of the 2000s, significant migration of middle class residents and infusion of capital investment has occurred in the rural fringe (N. Smith, Caris, & Wyly, 2001). The rural fringe characteristically falls into categories representative of both suburban and rural (Sharp & Clark, 2008). Small towns that represent urbanized clusters near larger metro areas are similarly different than small towns in more distant and remote areas.

Unfortunately, rural fringe areas are often included with all rural areas for analysis and this approach may distort results related to rural conditions. For example, one study in Texas that used county-level population cutoffs as a criterion to differentiate communities into urban, suburban, and rural found lower levels of extracurricular participation in urban adolescents compared to suburban and rural adolescents (Springer, Hoelscher, Castrucci, Perez, & Kelder, 2009). While that study examined participation rather than opportunities, it indicated the potential pitfalls encountered when solely using population size, rather than in combination with commuting patterns and proximity from urban centers, for rural classification. In terms of my study, it was clear from the findings that large differences
existed between rural and rural fringe schools and communities. On average, rural fringe schools had lower minority populations and fewer economically disadvantaged students, higher community median household income and level of education, and higher per pupil expenditure than schools located in more distant and remote rural areas. Because levels of environmental support for extracurricular physical activity were significantly higher at rural fringe schools, combining all rural categories would have erased any evidence of rural disadvantage in this sample.

The research is still unclear on how to best differentiate suburbs, rural fringe, small towns, and rural areas, rural fringe is expected to be “somewhere in between” rural and urban and should be considered separately from other rural areas (Kozeny, 2005, p. 129). Some researchers have attempted to account for differences between more remote rural areas and those located within the rural fringe. Many of these authors have chosen to combine rural fringe with suburban classification (e.g., Roscigno et al., 2006), considering this area’s characteristics and migration patterns largely mirror those of traditional suburbs. Based on the findings of the current study, this practice also might be problematic. The low levels of environmental support found in suburban middle schools were unanticipated. Had rural fringe been combined with the suburban classification, this finding may not have been observed. What was initially unclear from these findings was how suburban disadvantages have emerged. Two characteristics of suburban communities may contribute to these findings. First, it is possible that suburban communities in this sample, like suburban locations elsewhere in the country, had more public and private recreation facilities and
programs to service their adolescent population (i.e., parks, sport fields, swimming pools, and
gyms) than other areas (Churchill et al., 2007; Parks et al., 2003; Patterson et al., 2004;
Sanderson et al., 2003; Wilcox et al., 2000). If so, school-based environments for LTPA may
have been less of a priority as students participated in greater numbers outside of school.
However, a more likely scenario reflects the wide variation of suburban communities in this
sample.

Following World War II, the massive out-migration of White, middle-class residents
and employers from urban centers led to a significant increase of suburban populations and
created economic and social decay in inner cities (N. Smith et al., 2001; Wilson, 1996). The
idealized suburban community from this era still drives many assumptions of contemporary
suburbia. However, Jackson (1985) noted over a quarter century ago that patterns of
migration and capital investment in suburban areas were beginning to shift dramatically and
new suburban models were emerging. Particularly in rapid population growth areas of the
U.S., such as North Carolina, large-scale gentrification and corporate investment
significantly increased employment opportunities and residential viability in urban centers
(Atlantic Monthly, 2003; Cooke & Marchant, 2006). Through this process, many inner city
minority and lower SES residents were displaced into the suburbs. Concurrent with these
patterns of migration and investment in urban centers, housing development intensified in
rural areas adjacent to metropolitan areas as many White middle class residents continued to
migrate further out from the city and aging suburbs (N. Smith et al.). As this out-migration
occurred, incomes and capital investment declined sharply in many suburbs, especially as
former low income minority residents of urban centers moved into these areas. Growing pockets of poverty outside of urban centers prompted *Atlantic Monthly* to call these areas “suburban ghettos” (p. 45). Smith, Caris, and Wyly describe a diffusion effect similar to the historical abandonment of the inner city, with poor inner ring suburbs being surrounded by more affluent cities and rural fringe areas. If that is the case with the suburban communities within this sample, it may help to explain the unexpectedly low levels of environmental support among suburban schools compared to urban and rural fringe schools. It could indeed reflect the process of diffusion among population and capital away from suburban communities and into urban centers and rural fringe areas.

In summary, the findings of this study make significant contributions to the existing body of literature on place disparities in access to supportive environments for LTPA in three ways. First, expansion of the framework of deprivation amplification in a regional sample shows how disparities in supportive environments may contribute to higher levels of childhood obesity in rural areas. Second, exploration of underlying causes of place disparities, demonstrates how economic resources, social cohesion, and school structure all contribute to different levels of environmental support for extracurricular physical activity. Finally, the creation of a more specific measure of community type allowed for a deeper analysis of social and economic structures across communities that may contribute to geographic differences in access to supportive environments for LTPA. In the next section, I will outline recommendations for research and practice based upon the findings of this study.
Recommendations for Research and Practice

More research is needed to understand the higher levels of risk for childhood obesity experienced by disadvantaged segments of the U.S. adolescent population (Alfano et al.; Blacksher, 2008; Hedley et al., 2004; Liou et al., 2005; T. F. Nelson et al., 2007; World Health Organization, 2003). One particular area of increasing interest to researchers is whether children who live in poorer areas have reduced access to health-promoting facilities and programming, lower quality health care provisions, and fewer healthy food options (Glover, 2007; Macintyre et al., 2002; Wen et al.). These findings suggest that obesity rates may be higher among adolescents living in rural areas partially because they have fewer environmental supports to promote participation in extracurricular physical activity at their schools. However, to improve understanding of how these disparities may materialize and affect physical activity levels and obesity rates, further research needs to be conducted in two areas.

The first area in which further research can improve our understanding of place disparities in levels of adolescent LTPA is by continuing to expand the conceptualization of supportive environments and how they influence participation. As indicated earlier, it is unknown whether increased environmental support for extracurricular physical activity necessarily leads to increased rates of participation and physical activity. Additionally, questions remain as to what contribution participation in extracurricular physical activity plays in decreasing rates of childhood obesity among adolescents. Individual measures of participation in extracurricular programs, levels of physical activity, and body mass indices

268
of adolescents are needed to determine the relationship between environmental states and desired health outcomes. A random sample of students within a wide sample of schools in North Carolina could be examined over time by using accelerometers, observation, and self-reports. This investigation would further test contextual effects of school environmental support on levels of physical activity among adolescents.

This research was also limited to a small, although important, environment within communities. Future research should attempt to take a broader scan of all community environments for LTPA programs (e.g., private schools, public parks and recreation, commercial recreation firms, and non-profit organizations) to determine overall levels of community support for LTPA. This research can also be improved by including measures of quality for extracurricular programs and school environments. Although some objective measures have been developed, they generally focus on facilities or, if attempting to measure overall school environments, do not evaluate extracurricular programs. The development of objective measures of quality for extracurricular programs is needed.

Finally, the current research, as well as the extension of this research proposed above, provides a highly etic account of how adolescents interact with school environments. Future research should attempt to include more in-depth narratives from adolescents, parents, and school personnel to better understand how interpersonal, social, and environmental factors interact to facilitate or constrain participation in extracurricular physical activity. For example, what do stakeholders perceive the role of extracurricular physical activity within the school and community environment to be? As researchers continue advocate for policy
interventions, it is important to understand the views of the individuals who will most likely be tasked with implementing these policies and those whom will be most likely needed to support it. If, for example, these individuals believe that the role of these programs is to get more students physically active, then advocates for expanding inclusive programming may have willing allies to assist with their efforts. On the other hand, if the perceptions of these individuals are that extracurricular programs for physical activity should be focused on outcomes associated with interscholastic sports for elite athletes (i.e., developing athletes for college scholarships, winning championships, bringing revenue into the school), then they may be less receptive to implement policies initiated from outside that may be perceived to distract from these goals.

The second area for further research is more narrowly related to the findings of this study. These findings suggested some relationship exists between racial heterogeneity and levels of environmental support for extracurricular physical activity. Based upon previous research, it was speculated that this relationship emerged through lower levels of social cohesion and cultural factors. However, further research is needed to better understand how these two variables are causally linked and why this effect only occurred in rural areas. Additionally, more in-depth qualitative data is needed to explore the role of culture in rural areas and how it may influence policies and practices that determine levels of environmental support. Interscholastic sport seemed to be more of a priority for schools in rural areas than in other communities. It is possible that middle schools across the state viewed interscholastic sports as a baseline requirement for school programs and because rural
schools lacked additional economic resources, they were unable to offer programs beyond that baseline. However, it could be that rural school personnel, parents, and students, see interscholastic sports at the middle school level differently than in more urbanized areas. For example, how important are local sporting traditions to determining how resources are allocated for extracurricular physical activity programs in the feeder middle schools?

Finally, the observed deficits in levels of environmental support found in some suburban schools require further investigation. In particular, although the ability to interpret these results was limited, analyses of school-level and community-level variables for suburban schools suggested these areas might be more exposed to discriminatory practices within school districts. That is, individual schools within suburban school districts demonstrated much higher levels of variance in environmental support based on higher concentrations of minority and low-SES students than in other community types. Exploration of how these disparities emerged, and whether there are any disparate impacts for adolescents in schools with low support in suburban communities and those in rural communities. However, researchers should first ensure that classifications of suburban communities are accurate. North Carolina may be unique in variation among suburban and rural fringe communities and overlap among community types is certain to exist in any classification system. Additionally, there are relatively few schools that fit the NCES classification of suburban, which was reflected in the sample. Therefore, this finding should be critically examined to ensure these findings were not simply the result of sampling or classification error.
Research in leisure studies and arguably any academic field should not only add to the body of knowledge and build sound theories, but also should inform policy and practice (Burton & Jackson, 1989; Griffiths & Tann, 1992; Hemingway & Parr, 2000; Rothman, 2004). The findings of this study suggested that adolescents who live in rural areas and some suburban communities attend schools with fewer environmental supports for extracurricular physical activity. Although not explicitly examined in this study, it could be possible that the communities in which these children live also have fewer public and low cost amenities to facilitate LTPA outside of schools as well. If that is indeed the case, lower levels of environmental support may contribute to higher levels of sedentary leisure activities and higher risk of obesity for these children. Rural school districts overall had substantially lower local funds available for extracurricular programming. Additionally, rural residents had lower median household incomes indicating it might be more difficult for rural schools to raise additional revenues through fundraising or contributions than schools in more urbanized communities where residents had higher incomes.

At the basic level, this finding suggests that increased funding is needed in rural school districts for extracurricular physical activity. Based on currently available funding mechanisms, it is unlikely these districts will be able to generate these funds locally. Financial resources from state and federal sources should be made available for local school districts to use for extracurricular activities. North Carolina is already subsidizing poor and rural school districts that are unable to match the local tax revenues of more urbanized and affluent school districts. However, these funds are not available for co-curricular activities.
Increasing these supplemental funds to include funding for extracurricular programming may assist rural school districts in providing more extracurricular programs, improving facilities, and offering special transportation for students.

Recognizing that education budgets are shrinking at all levels of government and increasing emphasis is being placed on academic achievement, it should be noted that extracurricular activities should be considered complementary, rather than extraneous to the mission of education. Participating in extracurricular activities may be related to improved social development and academic performance among adolescents (Eccles & Barber, 1999; Fredricks & Eccles, 2006, 2008). Therefore, school administrators should recognize that providing opportunities for co-curricular programs might also be an important strategy in building school attachment and enhancing academic achievement. Additionally, the total expenditures for all North Carolina public schools in 2007-2008 on co-curricular activities was less than 1% of the budget allocation from state and federal sources (Division of School Business: Financial and Business Service, 2008). Minimal increases to offset funding deficits in rural and poor school districts might have minimal budgetary impact while having an important impact in improving environments for physical activity at schools in disadvantaged areas. However, providing increased funding for extracurricular physical activities in rural areas should come with an important requirement. Based upon research that supports the introduction of broader extracurricular physical activity programs to provide physical activities to a wider range of students (Bocarro et al., 2006; Floyd, Bocarro et al., 2008; Koplan et al.; National Association for Sport and Physical Education, 2002; U.S.
Department of Health and Human Services, 2001; Wechsler et al., 2000), additional funds should be used only to expand intramural programs and physical activity clubs in these schools.

These findings indicated that increased funding alone might not enhance environmental support for extracurricular physical activity at rural schools. Collective social functioning also seemed to be important in rural communities. Schools located in rural communities that possessed antecedent characteristics of high community social capital, particularly a racially homogenous population, were more likely to overcome fiscal deficits and provide a relatively higher level of environmental support. The relationship between racial heterogeneity in rural areas and lower investment in school extracurricular activities is not a clear one. It is possible that scarce economic resources in these areas exacerbate tenuous race relations in these communities and improved economic investment would eliminate this problem, as it seems to have in more urbanized communities. Conditions in rural communities with high racial heterogeneity in this sample that lead to lower environmental support might also be a product of historical racial inequality and power relations that hinder the development of social capital. If that is the case, implementing school policies and increased funds might not improve circumstances in these communities, although school districts and state administrators must ensure that resources are distributed equitably and not based upon historical stratification patterns. Rather, broader government policy at the state and federal level that improves overall social and economic conditions for racial and ethnic minorities and provide equal access to life chances may be needed to
ameliorate general social conditions in these rural communities. However, the relationship between increased provision for recreational physical activity and community social cohesion may be more interrelated. Putnam (2007) argues sport and recreation programs may serve as important sites to bring diverse groups together. Therefore, increased investment in extracurricular physical activity programs, as well as school and recreation facilities for physical activity, along with community partnerships may be a legitimate site for encouraging interaction and creating social cohesion in these communities.

Finally, school structure seemed to be an important factor in determining environmental support for extracurricular physical activity in rural middle schools. School structure should not be based solely upon tradition, but should be configured according to arrangements that are developmentally appropriate for children and adolescents. There seems to be valid arguments advocating for both K-8 and middle school configurations in this regard. However, strictly in terms of providing students supportive environments for extracurricular physical activity, K-8 schools seemed to be falling short. School district personnel that choose to use the K-8 model of school configuration for middle grades should be conscious of the social and physiological aspects of development on which students may be missing out. Policies, programs, and partnerships should be encouraged to ensure adolescents attending these schools are able to easily and freely access environments elsewhere in the community to meet their needs for LTPA similarly to students in middle schools.
The research findings in this study are primarily important to the education sector, and physical education or healthful living programs in particular. However, public sector organizations delivering youth physical activity (e.g., parks and recreation departments) might also enhance their services based upon the suggested applications of this research. Additionally, the findings of this study have key implications for broader recreation and leisure studies research and practice. Increasing rates of physical activity among adolescents during their leisure time has become an important objective for many public health agencies (Spangler & O’Sullivan, 2006). Both schools and public recreation providers are promoted as key institutions for delivering physical activity programming for children and adolescents (West & Shores, 2008). Public recreation departments have always been well-positioned in the delivery of public health and wellness initiatives (Ho, Payne, Orsega-Smith, & Godby, 2003; Spangler & O’Sullivan, 2006). Although not their primary function in society, schools are also increasingly relied upon to provide necessary physical and health education as well as physical activity programs and promotion (Erwin, 2008b). The current study verified the reality that in terms of promoting community well-being, no organization or field can succeed alone.

This study extends the research that suggests increased collaboration across community organizations to improve public health and quality of life. Spangler and O’Sullivan (2006) point out that only through collaboration across public, non-profit, commercial and educational sectors, can communities work together to improve quality of life for residents. Particularly in promoting physical activity among community residents,
collaborative efforts are necessary across multiple organizations (Henderson et al., 2001). For example, collaboration between public parks and recreation departments and other organizations has been strongly encouraged to develop healthier communities (Fridinger & Provence, 1994; Lovell Jr. & Snook, 2008; Payne, Mowen, Godbey, & Orsega-Smith, 2008; "Spanning all abilities," 2003). In one national study, 2/3 of public parks and recreation departments were engaged in partnerships with local school systems to promote physical activity (Payne et al.) Increased support for public goods for accessible LTPA programming and facilities requires community-wide advocacy and buy-in (Bocarro et al., 2009; Payne et al.; Yoder & Ham, 2005). An important way to encourage this support is through collaboration among key institutions. In many cases, parks and recreation departments have initiated this collaboration with schools to maximize resources to offer accessible programs and facilities to a broader range of adolescents in these areas. However, as indicated by Bocarro et al., promoting LTPA programs for adolescents may be a lower priority for public parks and recreation departments compared with other segments of the population (e.g., older adults and young children).

The findings in this study indicate that parks and recreation departments must be positioned to provide supplemental opportunities for adolescents (Spangler & O’Sullivan, 2006). Rather than duplicating services, partnerships should utilize resources to cast the widest net across the community to ensure a wide range of accessible places and programs for all children in these areas (Yoder & Ham, 2005). Eccles and Gootman (2002) suggested the importance of collaborative efforts across community institutions that provide a variety of
activities to appeal to the broad interests of adolescents. Schools, public parks and recreation departments, and leisure service providers should ensure that collaborative efforts present differential experiences for youth (Bocarro, Greenwood, & Henderson, 2008). Simply relying on schools or public parks and recreation to provide LTPA programs and facilities may inhibit the suggested diversity needed to attract and engage broad adolescent populations. Specifically related to the current study, parks and recreation departments can offer non-competitive physical activities and intramural programs which were less likely to be offered by many schools (Erwin, 2008b). Additionally, as Erwin suggested, parks and recreation programs can bring programming to adolescents. Transportation was potentially an important barrier for rural schools in this study. Through partnerships with schools, community-based recreation managers may be able to “offer free before- or after-school physical activity clubs/intramurals, promote active recess . . . or host physically active talent shows (e.g., dance-offs, motor skills competitions)” at schools sites (Erwin, p. 70). Erwin further suggests that schools and public recreation providers can seek out locations (e.g., shopping malls) where adolescents are already able to gather to organize physical activity programs. Adolescents in this study who attend rural schools were less likely than those more urbanized areas to have supportive school environments for LTPA. It was evident from these findings that both school personnel and parks and recreation managers in these communities must collaborate to maximize their assets and provide opportunities for the largest population of adolescents (Rios, 2006).
This study also expanded the research literature on leisure constraints. In particular, this study suggested how structural constraints may inhibit participation in leisure activities for some groups of individuals. The leisure constraints framework suggests that individuals perceive various intrapersonal, interpersonal, and structural barriers that inhibit or prohibit participation and enjoyment in leisure activities (Alexandris & Carroll, 1999; D. W. Crawford et al., 1991; E. L. Jackson & Scott, 1999; Orsega-Smith, Payne, Mowen, Ching-Hua, & Godbey, 2007). Differential structural environments can either constrain leisure behavior or facilitate it (Campagna et al., 2002; Raymore, 2002). The findings of this study indicated that the structural environments with which middle school students interact may either facilitate or constrain participation in LTPA depending on where these students live. One strength of the leisure constraints framework is that it provides a bounded structure within which to examine leisure behavior from multiple perspectives. For example, many researchers have chosen to exclusively study structural constraints (Orsega-Smith et al.), such as institutional discrimination, cost, spatial distance, transportation, and governmental policies (Campagna et al.; McMeeking & Purkayastha, 1995; D. Scott, 2000). Recognizing the relationship between structural and intrapersonal constraints reveals the context of individuals’ interactions with these structures that affect their access to recreational activities (Shaw, Bonen, & McCabe, 1991). Constraints theory also provides opportunities for researchers to examine barriers faced by individuals in different contexts and settings, such as disability sport activities or outdoor recreation (J. L. Crawford & Stodolska, 2008; White,
2008). This study expanded the body of knowledge in this area by examining structural barriers in the context of school environments.

Conclusions

The research findings in this study partially supported Macintyre’s (2000) proposition of deprivation amplification by demonstrating that adolescents who live in more deprived rural areas have fewer environmental supports for extracurricular physical activity at school. These deficits were largely explained by a lack of economic resources at both the district and community levels. Schools in racially heterogeneous rural areas reported the lowest levels of environmental support. Racially homogenous rural communities seemed to be more likely to overcome fiscal scarcity to provide more supportive environments for extracurricular physical activity in their schools. This relationship was possibly created by lower social capital or social cohesion in these communities. It is speculated that lower levels of environmental support for extracurricular physical activity in rural schools may be a contributing factor to decreased LTPA and higher obesity rates observed in these areas.

In proposing a model of deprivation amplification, Macintyre (2000, 2007, 2008) argues that the quantity and quality of accessible public resources that promote healthy lifestyles are lower within areas populated by socially and economically disadvantaged groups compared to more advantaged areas. Macintyre argues that this process serves to amplify the individual constraints to active living faced by the residents of these areas. Because the health-promoting resources to which individuals have access often determine health inequalities, the assumption is that the inequitable distribution of these resources
contributes to lower quality health in deprived areas (Bernard et al., 2007). Children and adolescents who live in some rural areas of the U.S. may be especially at-risk for overweight and obesity (Harrell et al., 2005; M. C. Nelson et al., 2006).

In addition to higher obesity rates in rural areas, lower levels of participation in LTPA, especially through organized programs, might have social implications for rural communities. Physical activity and sport programs can play a key role in maintaining the social well-being of rural areas (Putnam, 2007; Townsend, Moore, & Mahoney, 2002). Opportunities to invest in programs that encourage social interaction should be encouraged in rural areas. Because of the spatial dispersion of rural populations, opportunities for social interaction are often limited and developing community social capital is difficult (Wilkinson, 1991). Creating and sustaining organizations that provide activities for young people while bringing community members together, while always difficult in rural areas, is becoming increasingly harder amidst broad economic and social changes (Townsend et al.). Additionally, as indicated earlier, there may be a positive relationship between adolescent physical activity and academic achievement (Broh, 2002). Adolescents who participate in sport programs have higher self-esteem, feel more closely connected with friends, and more connected to school (Eccles & Barber, 1999). Although few researchers have examined this relationship, considering the diminished availability of physical activities for rural students may have some effect on the academic deficit found in rural areas. Finally, teenage girls who participate in physical activity report higher levels of confidence and self-esteem (Woods, 2007) and are less likely to engage in sexual intercourse and become pregnant (Cohen et al.,
2007). Rural areas have the highest rates of teenage pregnancy in the U.S. (Carter & Spear, 2002). The lack of opportunities for adolescent girls to participate in sport programs or be physically active in rural areas may also be a contributing factor to this problem.

Supportive environments for physical activity may mitigate individual constraints and make it easier for individuals to be physically active (Estabrooks et al., 2008; Stokols et al., 2003). Creating or enhancing places and programs for physical activity can increase the number of people who participate in LTPA (Floyd, Spengler et al., 2008). To successfully reduce levels of childhood obesity in the U.S., multiple organizations and community sectors must be actively involved (Henderson et al., 2001). In recent decades as families became more migratory, neighbors became more anonymous, and parents began to work longer hours, the levels of informal community supports available to encourage healthy behaviors among adolescents diminished (Eccles & Gootman, 2002). Therefore, more than ever in our nation’s history, schools have an increasing responsibility to develop children in ways beyond academic instruction. However, many policy makers have failed to recognize the importance of schools and other public institutions to facilitate leisure activities for children and adolescents in ways that complement their mental, physical, social, and emotional development. For example, North Carolina legislators introduced Senate Bill 377 (Low academic performance/No sports, 2009) which proposed eliminating extracurricular sports for public schools not meeting standardized testing benchmarks. Although this bill was targeting interscholastic sports, it reflects an overall trend that associates extracurricular school physical activity in the public’s mind as solely involving competitive athletics.
Additionally, the policies proposed in this legislation provided no alternative ways in which schools could deliver extracurricular physical activity programming to students. Rather than seeking to eliminate programs that are viewed as extraneous to the academic development of schools, policies should be introduced that include extracurricular school sport and physical activity in ways that emphasize fitness-based activities that are more inclusive for all students, regardless of gender, race, class, or ability.

Extracurricular physical activity programs in schools can improve the physical activity levels and social well-being of adolescents (Cohen et al., 2007; Wechsler et al., 2000). Access to physical activity programs and facilities should be equitably distributed across the population. The limited economic resources available for community and school sport, recreation and physical activity programs, as well as the politics of how these resources are allocated, may prevent some segments of rural populations from fully accessing environments at the same level of residents of more urbanized and affluent areas. Wilkinson (1991) argued that community development goes beyond economic development and should include improving the social, physical, and mental well-being of all people in rural areas. While rural areas face a number of social and economic problems, the expansion of access to physical activity programs in schools may be one small but meaningful way to improve the quality of life for that population.
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Appendix A
Copy of Web-based Self-Administered Questionnaire

Please note that the following questionnaire was presented in a web-based environment using html code. All text of the survey is included in this appendix. The layout of the survey, however, cannot be fully replicated in this format.
North Carolina State University
Middle School Program Questionnaire
Page 1

General Information

Thanks for helping out with this questionnaire about the programs and facilities for sports and physical activities in your school. We appreciate your assistance, and for completing this questionnaire fully and accurately, you will be paid $20.

Because we want to link the school information you provide to other school and community data previously collected, you will not be anonymous. However, we will treat all data with confidentiality. Additionally, this questionnaire only asks you to document objective and publicly-available information.

Your response will be important in helping us learn the types of programs that are available to middle school students across North Carolina. A summary report of the survey results will be provided to all participating schools.

I would be happy to answer any questions you might have about this survey. I can be reached at 252-289-0166 or at mbedward@ncsu.edu.

The deadline for completing this questionnaire is January 31.

*1. School Name

_______________________________________________

2. School District

_______________________________________________

* indicates question requires a response.
Interscholastic Sports

First we will be asking about interscholastic sports or athletics. Interscholastic sports refer to programs that provide competitive sports between different schools. THESE SPORTS CAN BE VARSITY OR CLUB STATUS.

1. Does your school offer interscholastic sports to students?

   Yes
   No
Interscholastic Sports Offered (Part 1 of 2)

1. Please indicate which of the following interscholastic sports teams have been or will be available at your school during the current school year.

These teams may be varsity or club status.

Important: Even if sport is open to boys and girls, only list as co-ed if the team has at least one participant of each gender.

Scale: Not Available, Girls team(s) only, Boys team(s) only, Separate Boys and Girls teams, Team for both Boys and Girls (Co-ed)

Basketball
Baseball
Track and field
Volleyball
Football
Cheerleading/competitive spirit
Soccer
Softball
Cross-country
Swimming and/or diving
Tennis
Wrestling
Interscholastic Sports Offered (Part 2 of 2)

1. Please indicate which of the following interscholastic sports have been or will be available at your school during the current school year.

These teams may be varsity or club status.

Important: Even if sport is open to boys and girls, only list as co-ed if the team has at least one participant of each gender.

Scale: Not Available, Girls team(s) only, Boys team(s) only, Separate Boys and Girls teams, Team for both Boys and Girls (Co-ed)

Golf
Gymnastics
Ice hockey
Weightlifting
Field hockey
Lacrosse
Rugby
Rowing/Crew
Riflery
Badminton
Water polo
Bowling
Downhill or cross-country skiing

Please list the details of any other sports offered but not listed:

2. Do any of your sports teams combine students from your school with students from other schools?

No
Yes
Combination Teams

Please give us some more information about combined teams from your school.

1. Please list the sports or teams that combine students from different schools?

2. Please list the school(s) that you combine with to field sports teams.
Interscholastic Sports Policies

1. Does your school's policies require any of the following for a student to be eligible to participate in interscholastic sports?

CHECK ALL THAT APPLY

- Minimum grade point average (GPA)
- Minimum class attendance
- Pass a minimum number of classes
- Good behavior at school
- Good behavior out of school
- Proof of medical insurance
- Proof of residence
- Pass a medical physical
- Age limit
- Other (please specify)

2. Does your school provide special transportation (e.g., an activity bus) to school or home for students who participate in interscholastic sports?

- No
- Yes, for some sports
- Yes, for all sports

3. If any student wants to play interscholastic sports, and is otherwise eligible, is he or she guaranteed a roster spot (i.e., a 'no cut' policy)?

- No
- Yes, for some sports
- Yes, for all sports

4. Does your school have multiple teams based on skill level or grade level for any of your interscholastic sports (i.e. a junior varsity team or separate 7th and 8th grade teams)?

- No
- Yes
Multiple Teams Information

We would like to get some information about the sports in which you offer multiple teams.

1. The following is a list of sports for which your school may field multiple teams. Please indicate the number of teams your school has for each of the following sports.

   For example, if you have separate 7th grade and 8th grade boys basketball teams, you would enter '2'.

2. If your school offers multiple teams in any other sports, please describe below.

   Scale: 0 1 2 3 4

   Football
   Boys' basketball
   Girls' basketball
   Volleyball
   Boys' soccer
   Girls' soccer

Sport participation expenses

1. Are students required to pay for any fees, physicals, uniforms, equipment, or camps to participate in interscholastic sports?

   No
   Yes, for some sports
   Yes, for all sports

Activity Fee Waiver

1. Are these expenses waived if a student cannot afford to pay?

   No
   Sometimes
   Always
Club Sports

We would like to know if any of the interscholastic sports you indicated earlier are offered as club sports. 'Club sports' refers to sports that offer competition between schools, but are not officially sanctioned by the school and district or are organized by outside groups (e.g. parents, local athletic association, booster clubs, etc.).

1. Are any of the competitive sports at your school offered as club sports?

   No
   Yes

Club Sports Teams

We would like to know a little more about your school's club teams.

1. Please list the sports offered as club sports.

2. Are 6th graders at your school allowed to play club sports?

   Yes
   No
   Our school doesn’t have sixth graders

3. Do students playing club sports have to pay a participation fee?

   Yes, for all club sports
   Yes, for some club sports
   No
Staffing

Next, we will ask you about the staff and volunteers who assist with interscholastic sports in your school.

1. **How many full-time or part-time school faculty or staff do you estimate perform the following duties over the course of a school year?**

   - Coach interscholastic sports teams
   - Assist with interscholastic sports events (sell tickets, concessions, etc.)
   - Organize fundraisers or sponsors for interscholastic sports

2. **How many VOLUNTEERS (including PTA or booster club members) do you estimate perform the following duties over the course of a school year?**

   - Coach interscholastic sports teams
   - Assist with interscholastic sports events (sell tickets, concessions, etc.)
   - Organize fundraisers or sponsors for interscholastic sports

3. **Will your school do any of the following to assist with the management, organization and planning of interscholastic sports?**

   *Scale: Yes or No*

   - Invite or encourage suggestions from parents or guardians
   - Invite or encourage suggestions from school faculty and staff
   - Invite or encourage suggestions from students
   - Invite or encourage suggestions from community members

4. **Does a certified athletic trainer provide services for your interscholastic sports teams?**

   - No
   - Yes, for some sports
   - Yes, for all sports
Barriers to Offering Interscholastic Sport

You indicated that your school does not offer interscholastic athletics. Please indicate the importance of each of these questions about why you might not offer these activities.

1. How important are the following to your school's decision to not offer interscholastic sports?

Scale: Not important at all, Not very important, Somewhat important, Very important, Extremely important

Not enough funding
Not enough coaches
Not enough students
Not enough interest from students
Not enough interest from parents
Not enough interest from administrators
Not enough time
Not enough space and/or facilities
Emphasis on academics in school programs
Other (Please explain)
Intramural Sports and Non-Competitive Physical Activity Clubs

We are now going to ask about intramural sports and physical activity clubs offered at your school. Intramural sports refer to programs that provide competitive sports within the school whether or not scores and standings are kept. Physical activity clubs refer to non-competitive student physical activity groups that meet periodically.

Extracurricular refers to programs that are offered outside of school time, such as before school, during lunch, or after school.

DO NOT INCLUDE INTERSCHOLASTIC SPORTS (Varsity or club) OR ATHLETICS.

*1. Does your school have any intramural sports or physical activity clubs?

Yes
No

Grade Level Participation

1. Are 6th graders allowed to participate in intramural sports and/or physical activity clubs at your school?

No
Yes, in some activities
Yes, in all activities
My school does not have 6th grade
Intramurals and Physical Activity Programs Offered (Part 1 of 3)

1. Please indicate which of the following intramural sports and physical activity clubs have been or will be available at your school during the current school year.

Scale: Not Available, Available to Boys Only, Available to Girls Only, Available to both Boys and Girls

Aerobics, such as step or low-impact
Badminton
Intramural Baseball or Softball
Intramural Basketball
Bowling
Bicycling (road, mountain, or BMX)
Cardiovascular fitness
Cheer/spirit (non-competitive)
Dance
Intramural Football, such as touch or flag
Frisbee golf
Intramural Golf
Gymnastics and/or Tumbling (non-competitive)

Intramurals and Physical Activity Programs Offered (Part 2 of 3)

1. Please indicate which of the following intramural sports and physical activity clubs have been or will be available at your school during the current school year.

Scale: Not Available, Available to Boys Only, Available to Girls Only, Available to both Boys and Girls

Hiking, backpacking, or orienteering
Intramural Hockey (floor, inline, or ice)
Jump rope
Intramural Lacrosse
Martial arts
Racquetball or squash
Rock climbing
Rowing, canoeing, or kayaking
Running or jogging (not track/field)
Skating (roller, inline, or ice)
Skateboarding
Skiing (snow or water)
Intramural Soccer
Surfing or windsurfing
Intramurals and Physical Activity Programs Offered (Part 3 of 3)

1. Please indicate which of the following intramural sports (IM) and physical activity clubs have been or will be available at your school during the current school year.

Scale: Not Available, Available to Boys Only, Available to Girls Only, Available to both Boys and Girls

Swimming (Intramural or lapswim)
Intramural Team handball
Intramural Tennis
Intramural Track and field
Intramural Ultimate Frisbee
Intramural Volleyball
Walking
Intramural Water polo
Whiffleball
Weight training
Intramural Wrestling
Yoga or flexibility
Please list the details of any other activities offered but not listed
Intramurals and Physical Activities Policies

1. Does your school's policies require any of the following for a student to be eligible to participate in intramural sports or physical activity clubs?

CHECK ALL THAT APPLY

- Minimum grade point average (GPA)
- Minimum class attendance
- Pass a minimum number of classes
- Good behavior at school
- Good behavior out of school
- Proof of medical insurance
- Proof of residence
- Pass a medical physical
- Age limit
- Other (please specify)

2. Does your school provide special transportation (e.g., an activity bus) to school or home for students who participate in intramurals or physical activity clubs?

- No
- Yes, for some activities
- Yes, for all activities

3. Do students pay an activity fee to participate in intramurals or physical activity clubs?

- No
- Yes, for some activities
- Yes, for all activities

Activity Fee Waiver

1. Is the activity fee for intramurals or physical activity clubs waived if the student cannot afford to pay?

- No
- Sometimes
- Always
Staffing

Next, we will ask you about the staff and volunteers who assist with extracurricular intramurals and physical activities in your school.

1. Does your school have a separate director or coordinator to oversee the organization of intramural sports or physical activity clubs?

   No
   Yes, on a volunteer basis
   Yes, a coordinator or director that is paid a stipend

2. Are staff paid a salary or stipend to supervise intramural sports or physical activity clubs?

   No
   Yes, for some activities
   Yes, for all activities

3. How many full-time or part-time school faculty or staff do you estimate perform the following duties over the course of a school year?

   Supervise or coach intramural sports
   Supervise physical activity clubs
   Organize fundraisers or sponsors for intramurals or activity clubs

4. How many VOLUNTEERS (including PTA or booster club members) do you estimate perform the following duties over the course of a school year?

   Supervise or coach intramural sports
   Supervise physical activity clubs
   Organize fundraisers or sponsors for intramurals or activity clubs

5. Will your school do any of the following to assist with the management, organization and planning of intramurals or physical activity clubs?

   Scale: Yes, No

   Invite or encourage suggestions from parents or guardians
   Invite or encourage suggestions from school faculty and staff
   Invite or encourage suggestions from students
   Invite or encourage suggestions from community members
Barriers to Offering Intramurals and Physical Activity Clubs

You indicated that your school does not offer intramurals or physical activity clubs. Please indicate the importance of each of these questions about why you might not offer these activities.

1. How important are the following to your school's decision to not offer intramural sports and/or physical activity clubs?

*Scale: Not important at all, Not very important, Somewhat important, Very important, Extremely important*

- Not enough funding
- Not enough coaches
- Not enough students
- Not enough interest from students
- Not enough interest from parents
- Not enough interest from administrators
- Not enough time
- Not enough space and/or facilities
- Emphasis on academics in school programs
- Other (Please explain)
Indoor Facilities

Next, we will ask about the places your school uses for indoor extracurricular physical activities, such as interscholastic sports, intramural sports, and non-competitive physical activity clubs.

1. How many of each of the following indoor facilities does your school have on-site for use in extracurricular physical activities, such as interscholastic sports, intramural sports, and physical activity clubs?

Scale: None, 1, 2 or more

- Gymnasium
- Indoor track (walking or running)
- Indoor pool
- Weight room
- Cardio fitness center
- Wrestling room
- Dance studio
- Racquetball or squash court
- Indoor rock climbing wall
- Other

2. Does your school use any of the following other places to conduct extracurricular physical activities outside of school time?

Scale: Yes, No

- Regular classrooms
- Cafeteria
- Auditorium or other multi-purpose room
- Media center
- Trailers or mobile buildings
- Other (please specify)

3. Does your school offer students "open gym" or "free play" in any of your school's physical activity or athletic facilities either before school, during lunch, or after school?

No
Yes

4. Does your school have a joint use policy with your local parks and recreation department to share indoor facilities?

No
Yes
We don't have a parks and recreation department
5. On average, how crowded are your indoor facilities during typical extracurricular times, such as immediately following school?

Less than 50% full
50% to 75% full
76 to 100% full
Over capacity
Our school doesn't have any indoor facilities

Page 25

Outdoor Facilities

Next, we will ask about the places your school uses for outside extracurricular physical activities, such as interscholastic sports, intramural sports, and non-competitive physical activity clubs.

1. How many of each of the following outdoor facilities does your school have on-site for use in extracurricular physical activities, such as interscholastic sports, intramural sports, and physical activity clubs?

Scale: None, 1, 2 or more

Track for walking, jogging, or running
Outdoor pool
Outdoor volleyball court (sand or hard)
Outdoor basketball court
Outdoor tennis court
Outdoor climbing wall
Baseball field
Softball field
Field for football only
Field for soccer only
Combined football/soccer field
General use field
Other  (please specify)

2. Does your school use a parking lot or black top area for outdoor extracurricular physical activities outside of school time?

Yes
No

3. Does your school have a joint use policy with your local parks and recreation department to share outdoor fields and facilities?

No
Yes
We don't have a parks and recreation department

Page 26
4. On average, how crowded are your outdoor facilities during typical extracurricular times, such as immediately following school?

- Less than 50% full
- 50% to 75% full
- 76 to 100% full
- Over capacity
- Our school doesn't have any outdoor facilities

Page 27

**Community Use of School Facilities**

Next, we will ask about the use of facilities on school property (both indoor and outdoor) for free play, for programs sponsored by community organizations (such as YMCA, parks and recreation department, Boys and Girls Club), or by members of your local community. Do not include school-sponsored interscholastic sports, intramural activities, or physical activity clubs.

1. **Outside of school hours or when school is not in session, do children or adolescents use any of your school's physical activity or athletic facilities for...**

   *Scale: No, Yes*

   - Community-sponsored sports teams?
   - Community-sponsored classes or lessons (e.g., tennis or dance)?
   - Community-sponsored supervised "open gym" or "free play"?
   - Unsupervised "open gym" or "free play"?
Special programs and collaboration

We will now ask you about special programs and community organizations which you may partner with or who may support your extracurricular sport and physical activity programs.

1. Does your school have any separate extracurricular programs for sport and/or physical activities for students with special needs?
   No
   Yes, organized by the school
   Yes, through an outside agency or organization

2. Please describe the activity level of a booster club or similar volunteer organization at your school that is specifically in place to support extracurricular sports and/or other physical activities.
   School doesn't have a Booster Club or similar organization
   Very inactive
   Somewhat inactive

3. Please describe the activity level of Parent-Teacher Association or similar volunteer organization at your school that is specifically in place to support the overall welfare of the school.
   School doesn't have a PTA or similar organization
   Very inactive
   Somewhat inactive
   Somewhat active
   Very active
4. Over the course of a school year, will your school work with any of the following groups to organize extracurricular sports and/or physical activities, including sponsorship or use of facilities?

Scale: Yes, No, Community doesn’t have

- Local health department
- Local hospital
- Local social services agency
- Local health organization, (e.g., American Cancer Society)
- Local college or university
- Local business
- Local parks and recreation department
- Local youth organization, (e.g., Boys and Girls Club)
- Local service club, (e.g., Rotary Club)
- Local health or fitness club
- Local country club

Page 30

Athletic Director or Administrator

Finally, we would like to get some information about your school's athletic director or other administrator who oversees extracurricular sports or physical activities.

1. Does your school have an athletic director?

- No
- Yes

Page 31

Athletic Director Information

1. Is your athletic director compensated for his or her work in this role?

- No
- Yes

2. Which of the following best describes the additional school employment duties of your school’s athletic director?

- No additional duties, athletic director is full-time
- Part-time teacher or administrator
- Full-time health or physical education teacher
- Full-time teacher in a subject outside of health/P.E.
- Full-time administrator
- Other
  (Please describe other)

Page 32
Thank You!

Thank you for your time and effort!

1. Please provide the following information about yourself. This portion is completely optional, but your information must be recorded in order to process compensation.

This information will not be publicly linked to your responses in the questionnaire. We will only use this information to send your compensation for completing the survey or to contact you about future opportunities to participate in this study.

2. For fully and accurately completing this questionnaire, you are being offered $20 in compensation from North Carolina State University. Please indicate below if you do not wish to be compensated or cannot accept payment for your participation.

I do not wish to be compensated or cannot accept payment for my participation

Name:
Address:
Address 2:
City/Town:
ZIP/Postal Code:
Phone Number:

If you have any questions or comments about this study and your participation in it, please contact Mike Edwards at (252) 289-0166 or mbedward@ncsu.edu
Appendix B

Copy of email message sent from Kymm Ballard to district personnel, December 4, 2008
To:
From: "Kymm Ballard"
Date: 12/04/2008 12:39PM
Subject:

As you know, we are all working to improve middle school athletics. I am currently working with a doctoral student at NCSTATE to gather some information.

Therefore, I am writing to ask your help in an exiting research project that needs our support. Mike Edwards is working on his doctorate at NC State in sport management. He is studying NC Middle School athletics. He hopes to put together a comprehensive report of all extracurricular sports and physical activity programs in North Carolina middle schools. We will be able to benefit from his research within the next year and he has agreed to present his data at NCAAHPERD next year for middle school athletics.

After completing his study, he will also write up a summary report which will be available to all participating school systems. This can be important information for our middle school committee.

We need to be able to reach out to all of the middle school athletic directors across North Carolina. Unfortunately, no complete, up- to- date database or list of these personnel is available here at DPI nor with other organizations.

Therefore, Mike will be contacting you directly by email next week to get the names and contact information for all athletic directors at middle schools within your district in order for him to gather his data. I have his word that any information you provide will only be used for the purposes of this study and will not be given out or used after the research is completed.

I know this is a busy time for everyone, but I sincerely appreciate your giving Mike your full attention and cooperation.

Thanks,

Kymm

Yours for Healthy Active Children,

Kymm Ballard, Ed.D.
Physical Education, Athletics, and Sports Medicine Consultant
K-12 Curriculum, Instruction and Technology
Healthy Schools Section
NC Department of Public Instruction
6349 Mail Service Center
Raleigh, North Carolina  27699-6349

344
Appendix C

Copy of email message sent to district personnel, December 8, 2008
Dear _____________,

My name is Mike Edwards and I am currently a doctoral student at NC State. Kymm Ballard from NCDPI may have alerted you that I would be contacting you.

For my dissertation, I am conducting a survey of middle schools across the state. I hope to inventory the availability of resources for sports and physical activity; including sports offered, facilities, parent and community involvement, and policies. In addition to my research project, I hope the information I collect will be beneficial to all school systems in North Carolina. I have offered to present my findings at NCAAHPERD next fall and I will provide all participating schools and school systems with a written summary report.

I need your help. I have to contact all middle school athletic directors in order to provide them access to my online survey. To ensure I get the most participation, it is important that I be able to communicate with them directly. Unfortunately, NCDPI has no complete or up-to-date listing of these school personnel. Therefore, I am writing to you in hopes that you can provide me with the name and email address of the athletic directors serving any middle school programs (or a larger school that includes middle school grades 6-8) under your jurisdiction. If your school system includes a regular middle school without an athletic director (i.e., they do not offer athletics), it is important that I also include information about that school in my study. In that case, please send me the name of that school and, if possible, a contact at the school that might coordinate extracurricular activities.

I need to send my questionnaire out by the second week of January. For that reason, it is essential that I begin communicating with athletic directors prior to the upcoming winter break. If you can send me your information soon, I would greatly appreciate it. As required by NC State’s research guidelines, the contact information I receive will only be used for this study. It will not be provided to anyone else and will be destroyed after the research is complete.

I am grateful for any assistance you can provide. Should you have any questions, please do not hesitate to contact me.

Sincerely,

--
Michael B. Edwards, M.A. (ABD)
Doctoral Candidate
Parks, Recreation, and Tourism Management
North Carolina State University
3026 Biltmore Hall
Box 8004
Raleigh, NC 27695
Appendix D

Copy of email message sent to potential participants, December 18, 2008
Dear ________,

I am writing to ask for your help with an important study being conducted by North Carolina State University to understand the types of sport and physical activity programs available to middle school students in North Carolina's public schools. This research is being carried out with the assistance and support of Kymm Ballard at the North Carolina Department of Public Instruction and is funded by a grant from the Robert Wood Johnson Foundation.

In January, I will be sending a request to each public middle school in the state to participate in this project by answering questions about the programs, policies, facilities, and staffing available for extracurricular sport and physical activity at your school. This questionnaire will only ask participants to document publicly available information. We are interested in your school's athletics, intramurals, or non-competitive physical activity clubs. If you do not offer these activities, your school's participation in the study is equally important.

I am writing to you at this time to request the name and email address of the best person at your school to complete this questionnaire. Where available, most schools have asked their athletic director to serve as the main contact for this study. Because some schools do not have athletic directors, other personnel including administrators and physical education teachers have also been suggested. We will do everything we can to make it easy and enjoyable for your personnel to participate. This research can only be successful with the generous help of people like you.

If you have any additional questions or comments, please do not hesitate to contact me.

Sincerely,

--
Michael B. Edwards, M.A. (ABD)
Doctoral Candidate
Parks, Recreation, and Tourism Management
North Carolina State University
3026 Biltmore Hall
Box 8004
Raleigh, NC 27695
Appendix E

Copy of email message sent to participants, January 5, 2009
Dear ____________,

I hope your holiday break went well. I am writing to remind you that in one week, you will be receiving an email providing a web link to a questionnaire. This questionnaire is part of an important study being conducted by North Carolina State University to understand the types of extracurricular sport and physical activity programs available to middle school students in North Carolina's public schools. When you receive this email next week, we hope you will go to the web survey and complete it before the January 31 deadline. We anticipate that it should take anywhere from 15 to 30 minutes to complete the questionnaire. For your time, and for fully and accurately completing the survey, you will be compensated $20.

To make it easier for you to prepare for the questionnaire, the specific areas we will be asking about are: 1) The different extracurricular interscholastic sports (including varsity and club sports), intramural sports, and physical activity clubs offered at your school (If you do not offer these activities, your school's participation in the study is equally important), 2) The policies related to participation in extracurricular sports and physical activity, 3) The approximate number of paid staff and volunteers that assist with coaching and organizing sports and physical activities at your school, 4) The number and type of indoor and outdoor facilities available for sports and physical activities at your school, and 5) The existence and activity level of any partnerships or relationships with other community organizations (e.g., booster clubs, PTA, parks and recreation departments, etc.).

If you have any questions or comments for me in advance of next week, please do not hesitate to email me or call me at ____________.

Thank you for your participation.

--
Michael B. Edwards, M.A. (ABD)
Doctoral Candidate
Parks, Recreation, and Tourism Management
North Carolina State University
3026 Biltmore Hall
Box 8004
Raleigh, NC 27695

350
Appendix F

Copy of email message sent to participants, January 12, 2009
Dear ______________,

As indicated in previous email messages, we are writing to ask for your participation in a study we are conducting at North Carolina State University. We are asking school personnel like you, in North Carolina's middle schools, to help us by documenting any programs and resources your school has for extracurricular sports and physical activity through an online questionnaire.

Please click on the link below to go to the survey website (or copy and paste the survey link into your internet browser).

Survey Link: [http://www.tinyurl.com/ncstatestudy](http://www.tinyurl.com/ncstatestudy)

Your responses to this questionnaire are very important and will help in advancing research and informing public policy that affects middle school programs in our state. This questionnaire should take anywhere from 15 to 30 minutes to complete, and for your efforts you will be eligible to receive $20 in compensation from NC State. You should also have the option to leave the survey and return to complete it later from the same computer.

Your participation in this survey is entirely voluntary and all of your responses will be kept confidential. No personally identifiable information will be associated with your responses in any reports of this study. Should you have any further questions or comments, please feel free to contact me at mbedward@ncsu.edu or on my cell phone at _______________. We appreciate your time and consideration in completing the questionnaire.

Thank you for participating in this study! It is only through the help of professionals like you that we can provide information to help bring attention to middle school sports and physical activity.

Many thanks,

--
Michael B. Edwards, M.A. (ABD)
Doctoral Candidate
Parks, Recreation, and Tourism Management
North Carolina State University
3026 Biltmore Hall
Box 8004
Raleigh, NC 27695
Appendix G

Copy of postcard reminder sent to participants, January 12, 2009
January 12, 2009

You should have received an email notice about an important study being conducted by N.C. State University on extracurricular sport and physical activity programs available to students in North Carolina’s middle schools.

An online questionnaire is now available at www.tinyurl.com/ncstatesudy and we hope you will go to the website and complete it before the January 31 deadline. We anticipate that it should take anywhere from 15 to 30 minutes to complete and for your time, you will be compensated $20. If you have already completed the survey, please accept our sincere thanks.

If you did not receive the email notice, or would like more information about the study, please contact me at ____________ or by email at mbedward@ncsu.edu

Sincerely,

[Signature]

Michael B. Edwards
Parks, Recreation and Tourism Management
North Carolina State University
Appendix H

Copy of email reminder sent to participants who had not yet completed survey, January 26, 2009
Dear ______________,

We recently sent you an email asking you to respond to an online survey about the extracurricular sports and physical activities at your school. Your responses to this questionnaire are important and will help inform researchers, policy-makers, and professionals about programs in North Carolina’s middle schools.

The survey should only take about 15 minutes to complete, and for your efforts you will be eligible to receive $20 in compensation from NC State. If you have already completed the survey, we appreciate your information. If you have not yet responded to the questionnaire, we encourage you to take a few minutes to do so. The deadline for completing the questionnaire is Saturday, January 31.

Please click on the link below to go to the survey website (or copy and paste the survey link into your internet browser).

Survey Link: http://www.tinyurl.com/ncstatestudy

A few school systems’ internet filters have been blocking the shorter web address, so the full site address link is:


Your participation in this survey is entirely voluntary and all of your responses will be kept confidential. No personally identifiable information will be associated with your responses in any reports of this study. Should you have any further questions or comments, please feel free to contact me at mbedward@ncsu.edu or on my cell phone at 252-289-0166.

We appreciate your time and consideration in completing the questionnaire. Thank you for participating in this study! It is only through the help of professionals like you that we can provide information to help bring attention to middle school sports and physical activity.

Many thanks,

--

Michael B. Edwards, M.A. (ABD)
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