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## Rural Active Living: A Call to Action

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### Abstract

Rural residents are less physically active than their urban counterparts and disproportionately affected by chronic diseases and conditions associated with insufficient activity. While the ecological model has been successful in promoting and translating active living research in urban settings, relatively little research has been conducted in rural settings. The resulting research gap prohibits a comprehensive understanding and application of solutions for active living in rural America. Therefore, the purpose of this paper was to assess the evidence-base for an ecological model of active living for rural populations and outline key scientific gaps that inhibit the development and application of solutions. Specifically, we reexamined the four domains conceptualized by the model and suggest there is a dearth of research specific to rural communities across all areas of the framework. Considering the limited rural-specific efforts, we propose areas that need addressing in order to mobilize rural active living researchers and practitioners into action.

### Keywords

physical activity; health disparities; rural; remote; Ecological Model

## Introduction

In 2006, Sallis and colleagues<sup>1</sup> advanced the thesis that a multi-level, ecological approach targeting individuals, environments, and policies across multiple domains must be employed to increase population levels of physical activity (PA). While this call to action has been exceptionally successful in the promotion and translation of active living research in urban settings, relatively little research has been conducted in rural settings. Rural residents, roughly 20% of the United States (US) population, experience social, natural, informational, and physical environments drastically different than those of urban residents.<sup>2</sup> Given that rural residents in the US have higher rates of obesity<sup>3</sup> and poverty<sup>4</sup> and engage in lower levels of PA<sup>5</sup> than their urban counterparts, rural settings are an important target for the reduction of health disparities through population-level PA increases. Yousefian et al.,<sup>6</sup> building upon the foundation provided by Sallis et al.,<sup>1</sup> advanced a conceptual framework to guide active living research in the rural US. While the Yousefian framework tailored a number of previously defined concepts to a rural setting (e.g., transportation, land use), and introduced others (e.g., community investment), this initial Rural Active Living model was rather limited in scope and germane to a specific rural setting. Unfortunately, little of the research that followed has refined or expanded this conceptual model to advance a more comprehensive model to guide Rural Active Living Research. Therefore, the purpose of this paper is to expand on the work of Yousefian and colleagues<sup>6</sup> to refine the conceptual framework, advance the rural active living research agenda, and outline key gaps in the scientific knowledge base inhibiting the advancement of this research agenda.

## What is Rural?

One of the challenges facing rural active living research is how to conceptualize and define rurality. Trussell and Shaw<sup>7</sup> argue that “rural” is a socially-constructed concept; however, like race (similarly socially-constructed), defining “rural” has utility in public health research and practice. In the scientific literature, authors regularly proclaim the study site as “rural” with no definition, and little or no rationale for the rural designation. Other authors offer conceptual definitions of rural including, 1) a residual condition of “not being urban”, 2) having low population or low population density, or 3) reliance on agriculture and extractive natural resource industries.<sup>8</sup> The U.S. Department of Agriculture presents rural-urban as a gradient in the form of nine Rural-Urban Continuum Codes,<sup>9</sup> which distinguish “...metropolitan counties by the population size of their metro area, and nonmetropolitan counties by degree of urbanization and adjacency to a metro area,” and 12 Urban Influence Codes,<sup>10</sup> which divide counties into groups by population and adjacency to urban settings. A critique of the county-level approach to rural identification illustrates that the use of county-level designations risks misclassifying the rural or urban residence of nearly half of the US population.<sup>11</sup> Concerns regarding misclassification have led researchers to employ a number of inconsistent definitions, resulting in a lack of standardization that makes comparisons across studies nearly impossible. To further complicate these inconsistencies, it must be considered that great diversity also exists within the continuum of rurality, especially with regard to land use, availability of natural amenities, and proximity to resources.<sup>8</sup> As such, many US counties have high levels of variability within rural and urban settings. For example, Isserman points out that the Grand Canyon is located in an “urban”

designated county.<sup>12</sup> Despite these conceptual/definitional inconsistencies, for this review, we present rural-based evidence as defined by authors of each specific study.

## Why Focus on Rural Active Living?

Rural residents are disproportionately affected by chronic diseases and conditions (e.g., diabetes, obesity) associated with insufficient PA.<sup>13</sup> Rural adults<sup>5,14</sup> are less active than their urban counterparts. While research on youth is more equivocal, findings suggest lower PA in rural adolescents.<sup>15,16</sup> Rural-urban PA disparities are not unknown to active living researchers. However, a conceptual fallacy often emerges as investigator derived “rural strategies” to target PA behavior treat rural communities merely as small urban ones, transposing what is known from urban literature to rural settings. The result of these conceptual fallacies is often wasted human and fiscal resources, which ultimately leads to frustration and fatigue. Although urban-derived strategies can be a helpful starting point for conceptualization, it is important to consider rural America as a distinct type of setting that offers unique opportunities and challenges for active living.<sup>6,17-19</sup> As such, theoretically supported, methodologically rigorous, and empirically tested “rural strategies” for intervention are a necessity. Unfortunately, the studies that currently exist often lack a theoretical foundation, employ a non-rigorous research design, contain methodological flaws, or all three. For example, it is not uncommon to see an a theoretical study that employs a quasi-experimental design and self-reported physical activity. As such, the limited quantity and quality of rural active living research prohibits a comprehensive understanding of solutions for rural America.

## An Ecological Approach to Rural Active Living

The ecological approach to active living suggests that individual PA behaviors enacted in four domains (i.e., Recreation, Household, Occupation, and Transportation) are the result of the interaction of the individual person and the environments with which the individual encounters on a daily basis<sup>1</sup> (Figure 1). Sallis and colleagues<sup>1</sup> depict these multi-level influences as rings of influence of PA, suggesting that each ring influences other rings, as well as PA itself. The model starts with the individual, Intrapersonal factors, the perceived environment, and PA behavior occurring in four specific domains (Active Recreation, Household Activities, Occupational Activities, and Active Transportation). Sallis and colleagues encompass these influencing factors within Behavioral Settings: Access & Characteristics, including the following environments within the four domains of PA behavior: home, neighborhood, recreation, workplace, transportation information, and schools. Finally, Sallis and colleagues encompass all of these factors within two concluding rings: Multi-level, cross-cutting Environments (Information, Social Cultural, and Natural), and the Policy Environment. Sallis and colleagues' ecological model is presented in Figure 1.<sup>1</sup>

While much research has been conducted to examine correlates and determinants of PA, very little research has been conducted in rural communities, or to compare rural to urban residents. Correlates are factors that exhibit a positive or negative cross-sectional *association* with PA, while determinants are factors that *predict changes* in PA over time.<sup>20</sup> Historically,

studies of PA correlates and determinants have primarily focused on intrapersonal (e.g., enjoyment, self-efficacy, weight status) and interpersonal factors (e.g., social support, parental modeling), with more recent work focusing on environmental attributes and relevant policies.<sup>21-27</sup> It is also recognized that perceived and objective measures of the environment are independently important to active living.<sup>1,28</sup> Thus, in the paragraphs that follow, no distinction is made between perceived and objective environment measures as we present a summary of the rural evidence from active living literature. This article is organized by level of the ecological model (Figure 1), presenting evidence working from the Intrapersonal level (innermost ring) outward to Behavior Settings; Multi-level Environments (Social Cultural, Information, and Natural); and concluding with the Policy Environment (outermost ring).

## Intrapersonal

There is very little published evidence comparing urban and rural intrapersonal correlates and determinants of PA, and the little current evidence that exists suggests that there are not differences between rural and urban residents within the intrapersonal domain. However, the vast majority of the available evidence comes urban settings or geographically heterogeneous settings presented in aggregate. In these studies with largely urban/suburban samples, intrapersonal, individual-level characteristics have received a great amount of attention in the past as correlates and determinants of active living (e.g., enjoyment, self-efficacy, weight status, etc...).<sup>21-27</sup> Potential confounding effects of sex, race, and body mass index have historically been controlled for in studies of PA correlates and determinants in adults and youth.<sup>25-27,29</sup> Being female, a member of a minority group, or having low family income is associated with low levels of PA measured by self-report<sup>27,30,31</sup> or accelerometry<sup>27,31-33</sup> in adults and youth. In 2000, Sallis et al.<sup>24</sup> conducted a comprehensive review of 108 studies on correlates of PA separately for children (ages 3-12) and adolescents (ages 13-18). These studies evaluated 40 variables for children and 48 variables for adolescents. With few exceptions, the studies employed cross-sectional designs focusing on intrapersonal and interpersonal variables among predominantly urban participants. In adolescents, sex (male), race (white), age (inverse), perceived activity competence, intentions, depression (inverse), previous PA, sensation seeking, parental support, and support from siblings/others were significantly associated with PA.<sup>24</sup> A more recent 2011 review of published studies examining determinants of PA in youths indicates that smaller declines in PA are predicted by higher perceived behavioral control, support for PA, and self-efficacy.<sup>34</sup> Another recent review by Bauman and colleagues<sup>27</sup> found similar results in adults, where health status, self-efficacy, personal history of PA as an adult, intention to exercise, age (inverse), sex(male), education, overweight (inverse), and perceived social support were significant correlates and/or determinants of PA.

## Behavior Settings

Behavior settings are the places where PA may occur<sup>1</sup> (e.g., home, neighborhood, recreation settings, schools, workplaces, transportation settings). In the model by Sallis and colleagues, Behavior Settings stem from the PA Behavior: Active Living Domains and include places where these domains of PA occur. Limited research has focused on access to and characteristics of rural behavior settings; however, existing evidence suggests that

relationships between behavior settings and PA may be different in rural compared to urban communities.

### Home/Neighborhood

Across rural and urban settings, in the home environment, the availability of exercise equipment,<sup>35</sup> family limits on screen time,<sup>36</sup> and familial social support are associated with increased PA.<sup>35</sup> At the neighborhood level, residents who recreate actively and engage in more PA tend to have neighborhoods with sidewalks, street lights, and traffic calming methods.<sup>37</sup> For rural residents, living in a home with high levels of social support and more exercise equipment, and residing in communities with traffic safety, pleasant aesthetics, and access to recreation facilities, trails, and parks are most consistently associated with PA.<sup>2,37</sup> Walking and cycling are often unsafe in rural communities and neighborhoods due to fast moving traffic, competition with commercial traffic, and infrastructure challenges.<sup>2,6,37-39</sup>

### Recreation Settings

The recreation environment is frequently different in rural areas. Often, access to outdoor recreational opportunities is limited and many trails and other open spaces are informal, unmarked, and/or poorly maintained.<sup>6,40</sup> There is evidence to suggest that rural residents may be more willing to travel farther distances to access parks and trails and thus, proximity to these resources may not be as important in rural compared to urban settings.<sup>41,42</sup> Trails hold great promise as a cost-effective means to promote PA in rural settings.<sup>71,43-46</sup> The rails-to-trails movement has produced over 22,000 miles of trails from abandoned rail beds.<sup>47</sup> Given that many rural towns were built when rail transportation systems were dominant, the current rails-to-trails movement may present an important opportunity for rural communities. Partnerships among organizations to co-produce recreation programs may also be more important in rural compared to urban settings, and some evidence suggests a heightened importance of recreational, amateur, and school sport leagues in rural communities.<sup>48-50</sup> Additionally, places of worship are a salient resource within rural settings; however, aside from offering PA programming to congregants, limited research has been conducted to examine the role of churches as a place to be active.<sup>51</sup> Other community assets, such as fire houses, malls, federally qualified health centers, community resource centers, health clinics, and more may play an important, albeit non-traditional, role in promoting PA.

### Schools

Activity-friendly school environments tend to have active students; however, few researchers have examined rural-specific school correlates, determinants, and approaches.<sup>52</sup> Rural children have few opportunities to accumulate PA outside of school.<sup>53</sup> Therefore, increasing time spent in physical education and active recess, incorporating PA into instruction time, and increasing the frequency of short-bout activity breaks during the school day are four important strategies to increase PA for rural school children<sup>18,54-57</sup> It is also important to note that school consolidation is a notable challenge for recreation and transportation PA in many rural areas as children are faced with increasing commuting distances, transportation barriers for after school programs, and no practical option for active commuting to school, especially when schools are consolidated away from towns.

## Workplaces

Traditional agricultural, extraction, and manufacturing industries in rural settings have significantly declined in recent decades.<sup>35</sup> Rural residents are now more likely to work in service sectors and commute greater distances; most likely reducing occupational, transportation, and leisure PA.<sup>35,58</sup> Very limited research has been conducted to examine workplaces located in rural areas and studies that have been published have either taken a broad health promotion approach to include PA programming or involve purchasing exercise equipment for employee use.<sup>59</sup> The notable challenge posed by greater commuting distances for many rural residents reinforces the need to examine how workplaces influence active living specifically in rural settings.

## Transportation Settings

Rural residents may be less able to engage in active transportation due to greater physical distances, limited public transit, low population density, and the availability of ample parking.<sup>6,44,60,61</sup> Some evidence also suggests that “active transportation” has an alternative meaning in rural settings that have greater geographic dispersion; where active transportation often means availability of transportation to get to a PA resource location. Recent analysis of national data from 2000 has shown that rural census tracts, relative to metropolitan ones, have less high-intensity development, developed open spaces (e.g., parks, trails), intersection density, and street segment density, and have longer median block lengths; all suggesting lower walkability in rural areas.<sup>40</sup> Additionally, rural roads are structurally designed to facilitate higher speed traffic and rarely provide bike lines, sidewalks, footpaths, or shoulders;<sup>62,63</sup> however, the relationship between sidewalks and activity in rural areas is mixed and may not be as critical in rural areas.<sup>35,64</sup> Recent work in rural Georgia is helping to define rural walkability and it appears that sidewalks and utilitarian destinations often important for urban walkability are not as critical for rural walkability.<sup>35,64</sup> For example, perceived neighborhood walkability may indirectly affect PA through intra- (self-efficacy) and interpersonal (social support) factors by facilitating highly valued social interaction rather than travel.<sup>64</sup>

## Multi-level Environments

Sallis and colleagues present environment broadly in their model, but also focus on three specific crosscutting multi-level segments of environment (social cultural, information, and natural). Here these specific segments of the environment are examined within a rural context.

## Social Cultural Environments

Both social and physical environmental factors have received little attention in the rural active living research literature, but the limited existing literature suggests that the characteristics associated with PA in rural settings may be different than those in urban settings.<sup>65,66</sup> Furthermore, the strength of these associations may differ in rural areas as compared to urban areas,<sup>67</sup> and often current literature explores the roles of social cultural factors in conjunction with physical environment factors given the complex interrelated nature of these factors when it comes to PA. In response to these findings, social cultural



environmental factors such as crime,<sup>21,68,69</sup> safety,<sup>70,71</sup> social support<sup>35,72,73</sup> and physical environment supports for PA (e.g., sidewalks, parks, walking trails)<sup>74</sup> at the macro level have been considered in rural and urban settings independently, but few studies have compared across setting.<sup>16,75,76</sup> Access to facilities and equipment for PA is moderately associated with recreational PA and sports in urban youth<sup>23,24,77</sup> with few studies having confirmed these relationships in rural youth.<sup>78-80</sup> A review of studies examining environmental support for PA (most conducted in urban settings) determined that, as children grow, high PA was only observed in those with access to supervised PA programs and community-based sports.<sup>81</sup> Similarly, access to high quality, user-friendly, supervised facilities, natural amenities, and age-appropriate programs was associated with higher levels of PA.<sup>22,78,82,83</sup> Unfortunately, very little research<sup>15,75,84-87</sup> has been conducted to compare correlates of PA among urban and rural youth.

Recent studies with urban adult populations have demonstrated the importance of environmental factors such as community socioeconomic status<sup>66,88</sup> and accessibility to PA venues<sup>89-92</sup> in explaining PA behaviors (primarily walking and bicycling). Lack of programmatic activities and social connections appear to be important correlates, but these are potentially the most resistant to intervention in rural settings.<sup>93,94</sup> In the most recent rural-specific review examining the relationship between the social and physical environments and PA in adults, Frost and colleagues<sup>2</sup> found that aesthetics and civilities, perceived safety (from crime or traffic), and the presence of parks, trails, and recreation facilities were most consistently associated with PA in rural adults. The associations between sidewalks or traffic density and PA, which are consistently associated with PA in urban adults, were not consistently associated with PA in rural adults.<sup>2</sup> Taken together, rural residents are more likely to lack facilities and programs<sup>17,95,96</sup> and experience geographic isolation that can lead to reduced social support for PA.<sup>75,76</sup> A common theme observed in reviews of social and physical environments and PA in urban and rural settings is a continued reliance on subjective measures of PA and observational study designs.<sup>15,24,26,77,97-99</sup> Objective measures of social and physical environments for PA<sup>28,100</sup> are limited, particularly for rural areas.

### Information Environment

The information environment encompasses all behavioral settings, as messaging that promotes or reinforces sedentary behavior is omnipresent in our society. Evidence suggests that health information dissemination in rural communities may rely more heavily on building social connections than in urban areas.<sup>101,102</sup> Utilization of community health advisors and ongoing social networks is associated with retention in PA behaviors,<sup>101,102</sup> and online social networking is increasingly more popular as a source of health information among rural as compared to urban residents.<sup>101,102</sup> Furthermore, social marketing utilizing community-based participatory methods and mass media messaging has been successful in promoting walking among older Americans in predominantly rural areas.<sup>103-106</sup>

### Natural Environment

The primacy of urban built environments has reduced the importance of natural environments in the ecological model in which natural environments are primarily

positioned as presenting barriers to PA.<sup>83,107</sup> It is possible that residence in a rural community may exacerbate barriers created by the natural environment. However, less emphasis has been placed on the role of proximate access to natural environments that may facilitate PA in rural settings.<sup>83,107</sup> Research in the U.S. and Europe suggests that access to natural amenities that can facilitate recreation may be associated with PA in rural settings. More research is needed to understand how natural environments may uniquely promote physical activity in rural settings.

## Policy Environment

Policy approaches to increase PA are gaining popularity due to their potential to have broad reach and impact across many behavior settings if widely adopted and fully implemented.<sup>21</sup> Recommended policies are varied in focus and scope and include such things as programmatic adoption (e.g., Safe Routes to School<sup>108</sup>), instructional policy (e.g., Physical Education mandates<sup>109</sup>), voluntary programmatic policies (e.g., the North Carolina Afterschool PA Standards<sup>110</sup>), facility use policies (e.g., shared use agreements<sup>111</sup>), school level policies (e.g., Comprehensive School PA Programs<sup>112</sup>), transportation policies (e.g., Complete Streets<sup>113</sup>), zoning and planning policies (e.g., Smart Growth<sup>114</sup>), and targeted funding for implementation of community level activities (e.g., North Carolina Eat Smart Move More Community Grants program<sup>115</sup>). Most of these policies involve the school at some level, be it facility usage or instructional time allocation. However, implementation of a statewide Complete Streets policy in a context-sensitive way could have a significant, positive impact on active living in rural communities across all segments of the population.<sup>116</sup> Nevertheless, while success has been achieved in the adoption of these policies in urban areas, an understanding of the factors associated with successful implementation and resultant impact is extremely limited.<sup>94,117</sup>

While little research has examined factors associated with policy adoption, implementation, or effectiveness in rural communities, the existing literature suggests a need for rural-specific strategies, which may or may not receive support due to cultural characteristics of rural communities. Rural settings have been the focus of a handful of policy studies, however, studies to compare policy adoption, implementation, and effectiveness by level of rurality and across settings (e.g., neighborhood, school, work) have been very few in number.<sup>94,117</sup> Limited existing work in rural active living policy identifies associated cultural factors, specifically a libertarian ideology resistant to government mandates, limited human capital, and difficulty with leadership understanding the connection between social and economic policy and health outcomes as important characteristics.<sup>114,118</sup> In addition, rural settings typically have a limited number of community PA resources, thus providing area residents with access to school environments outside of school hours, workplaces, or other community assets (e.g., places of worship, fire houses, etc.) is important.<sup>62,64</sup> Future research is needed to better understand the use and role of joint-use agreements in rural settings.<sup>64,119</sup> Many rural municipalities have the same tools and authority as urban municipalities to implement zoning, development, and planning policies and processes, supporting similar approaches, correlates, and determinants in both urban and rural settings.<sup>114,118</sup> It is important, however, that great care be taken when extrapolating findings



from urban studies of policy adoption, implementation, or effectiveness and applying them to rural settings.<sup>94,114</sup>

## Conclusion

### Rural Active Living: Call to Action

Considering the dearth of rural-specific efforts in the field of active living described herein and elsewhere, there are a number of specific areas that need to be addressed in order to mobilize rural active living researchers and practitioners into action. First, the concept of “rurality” for active living research needs to be systematically defined, operationalized, and empirically tested. Second, the practice of treating rural settings as “less populated urban areas” does not accurately reflect the unique social, cultural, and environmental contexts of rural communities and thus needs to end. Third, rural active living researchers and practitioners need to recognize, understand, and plan for the diversity that exists within the continuum of rurality. Fourth, qualitative studies are needed to better identify and characterize the unique influential variables in rural environments. Fifth, rural-specific environmental assessment measures need to be developed and empirically tested and validated (e.g., RALA, RALPESS).<sup>28,100</sup> Sixth, objective measures need to be employed to assess PA and sedentary behaviors of rural residents (e.g., accelerometers). Seventh, ecological models such as Sallis and colleague's<sup>1</sup> should be used to guide the establishment of a rural-specific evidence base to validate many of the active living domains that have yet to be tested in rural communities.<sup>114</sup> Lastly, rural active living researchers need to partner with local government and other groups to capitalize on natural experiments when they present themselves in rural settings (e.g., policy implementation, trail construction) in order to assess the impact of such events before and after implementation. Upon responding to these immediate calls to action, researchers and practitioners need to utilize the evidence to revisit and ultimately design an evidence-based guiding framework for rural active living.

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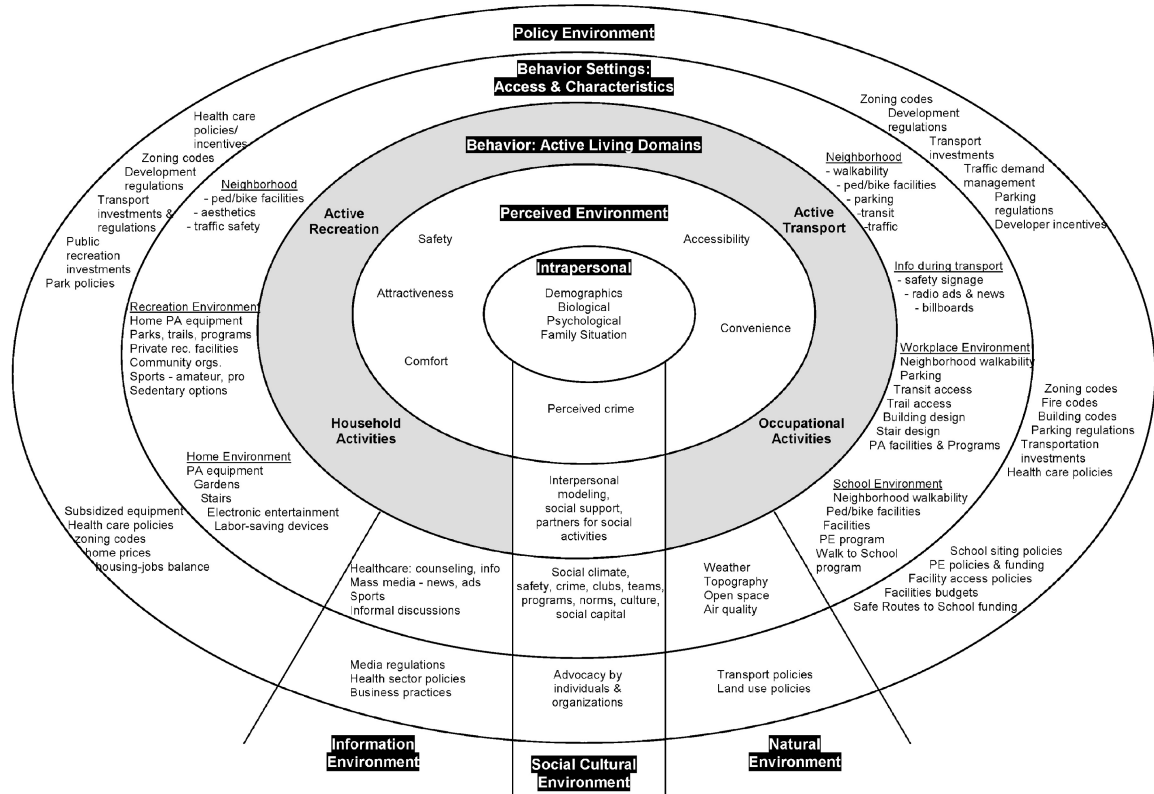



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## Ecological Model of Four Domains of Active Living



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**Figure 1.**  
Ecological model of four domains of active living.<sup>1</sup>  
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