Evaluation of Active Living by Design
Implementation Patterns Across Communities

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Background: Twenty-five cross-sector, multidisciplinary community partnerships received funding through the Active Living by Design (ALbD) national program to design, plan, and implement innovative initiatives to support active living.

Purpose: This paper examines implementation patterns across ALbD community partnerships related to community characteristics; preparation efforts; and policy, environmental, programmatic, and promotional strategies.

Methods: Investigators used a mixed-methods, participatory evaluation design, triangulating multiple qualitative and quantitative data sources collected from 2007 to 2009. Configural frequency analysis facilitated detection of variables as well as configurations of variables occurring more (types) or less (anti-types) frequently than patterns expected by chance alone.

Results: Overall, community partnerships with more preparation activities (assessment, sustainability) implemented a larger number of active living promotions, programs, policy influences, and physical projects, cumulatively (type). Yet, community partnerships working in communities with >40% of the population from a non-Caucasian racial and ethnic background and >40% of the population in poverty implemented fewer active living promotions, programs, policy influences, and physical projects, cumulatively (type).

Conclusions: The resulting types and anti-types provide insight into patterns across communities that may be ascribed to varying configurations of community contexts, resources, and strategies implemented. Rigorous, systematic examination of the underlying causal structures related to the configurations of community characteristics, preparation efforts, and implementation strategies is needed.

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Introduction

Community-level interventions to increase active living aim to prevent physical inactivity,[1] related chronic diseases and conditions,[2,3] and associated costs for medical treatments.[4–6] To maximize population impact and minimize health disparities, these interventions take into account social, economic, and environmental influences on health and health behaviors.[7–9] In addition, these interventions take place in the milieu of existing community policies, practices, and environments,[10,11] and alongside changes already underway in communities. To date, there is not a recipe or set of key ingredients for implementation of these comprehensive, community-level active living interventions. Consequently, these circumstances represent "wicked problems" for public health practitioners and evaluators,[12] who seek to design interventions and explain intervention impacts in the context of the population dynamics, epidemiology, and configuration of resources unique to each community.

Although traditional approaches to process evaluation identify intervention components, implementation methods, and adaptations to local context,[13] the multiple pathways to increasing population levels of physical activity are not likely to be delineated through these methods. These pathways are fraught with ambiguity, making it difficult to distinguish dominant influences from factors with less influence.[14] For instance, racialized conditions may affect or be affected by interventions seemingly unrelated to race, such as the impact of efforts to reduce urban sprawl on the cost of housing in inner-city neighborhoods.[15] These wicked problems suggest the timeli-

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ness of new approaches to embrace the complexity inherent in community-level interventions.

In November 2003, the Robert Wood Johnson Foundation awarded grants to 25 community partnerships across the U.S. as part of the Active Living by Design (ALbD) national program (www.activelivingbydesign.org). The ALbD's Community Action Model provided five strategies (5Ps) to influence community change: preparation, promotions, programs, policy influences, and physical projects.[16] The 5P Model represented an integrated, comprehensive approach to increase physical activity through cross-sector, multidisciplinary partnerships working across many settings and populations.

The primary goal for the ALbD evaluation was to identify common patterns of implementation across the various community contexts and the varying community resources, capacities, and intervention activities. The comprehensive, community-based ALbD approaches unfolded in an array of local settings, including counties, metropolitan areas, municipalities, and neighborhoods. Heterogeneous populations in the communities experienced a variety of historical, social, and economic conditions that influenced the change process. In addition, community partners frequently worked simultaneously on planning, implementation, enforcement, and sustainability activities with varied local resources and capacities. Best practices from many of these communities have been reported in a previous supplement to the *American Journal of Preventive Medicine* (*AJPM*).[17]

To track the complex intervention pathways, rigorous yet flexible assessment and evaluation methods captured multicomponent and dynamic community trends.[18] Configural frequency analysis (CFA) examines the level of key resources in communities and how they are arranged.[19–21] CFA can identify potential differences in communities because it allows for a case-oriented, as opposed to variable-oriented, approach to analyzing community-level data.[22]

Variable-oriented analyses seek to explain associations between variables across communities, whereas case-oriented analyses can identify clusters of communities having different levels of variables. CFA is similar to cluster analysis and latent growth curve analysis in that it can detect configurations of cases that deviate from what is expected. These deviations are the result of a system that "pushes" certain cases in a direction away from the general pattern. CFA provides a way to identify community patterns that may be associated with different underlying systems.

To further the field of active living, this exploratory analysis seeks to (1) identify configurations of intervention populations and settings, partnership and community resources and capacities, and policy, environmental, programmatic, and promotional strategies associated with implementation of the 25 ALbD community demonstration projects; (2) examine configurations across four community sectors associated with active living, including community design, active transportation, parks and recreation, and schools; and (3) suggest implications for evaluation of complex active living interventions in the field based on these findings.

Methods

To evaluate the ALbD community demonstration projects, investigators employed a mixed-methods, participatory evaluation design to obtain objective measures and subjective perceptions of community partnerships related to the implementation of the 5P strategies (preparation, promotions, programs, policy influences, and physical projects).[23–26] The multiple methods and measures as well as the associated strengths and challenges of these methods have been reported in a companion article[27] in this *AJPM* supplement. Investigators used CFA to identify patterns, or configurations of variables, among community partnerships.

Data Sources, Reduction, and Analysis

From 2007 to 2009, the primary sources of data collected for this cross-site analysis included information reported in community partnership proposals and reports, community partnership responses to the Partnership Capacity Survey, and transcribed responses from key informant interviews and focus groups with staff, partners, and community representatives identified by the community partnerships.[27] Through a web-based "diary" format organized by the 5P strategies, the Progress Reporting System (PRS) also documented community partnership activities and accomplishments in "real time" from 2003 to 2008. Each community partnership coded its activities according to the 5P strategies and the Evaluation Coordinator at the ALbD National Program Office subsequently checked and corrected all codes to ensure consistency across community partnerships. However, the actions were not systematically verified with the community partnerships.[28]

In-person or phone interviews and focus groups were conducted with staff, partners, and residents to understand activities and accomplishments related to the 5P strategies. These qualitative data were analyzed using focused coding procedures to identify indigenous themes, or ideas and concepts derived from the data. Themes from the interviews and focus groups were organized inductively into categories, or sensitizing concepts, to create new variables or to replicate existing variables from the PRS.[18,29] Results from the interviews and focus groups were summarized into case studies and validated with the project director or coordinator for each community partnership.

A systematic data reduction approach generated variables from the qualitative themes and quantitative measures in order to assess both the type and number of occurrences for each variable. For instance, investigators assessed partner disciplines and the total number of partners, assessment methods and the total number of assessments, and policy action types and the total number of policy changes. Variables derived from the qualitative and quantitative data were coded in two primary ways: (1) community and partnership characteristics were reduced to two- or three-level variables using criteria described in the next section, and (2) preparation and

implementation indicators were coded using a median-split to identify relatively higher or lower values for the communities, suggesting the "dose" of these activities for each community partnership.[13,30,31]

Variables

Community characteristics included race and ethnicity, poverty, population size, geographic scale, and region. The 5Ps reflected a number of strategies related to preparation, promotions, programs, policy influences, and physical projects. Preparation indicators incorporated the type of lead agency, the types of partners, the number of core partners, the size of the network of partners, partnership capacity, community capacity, the number of community assessments, the amount of resources generated, and the number of sustainability efforts. To complement these preparation indicators, implementation indicators included policy changes and physical projects as well as promotions and programs.

Lastly, integration indicators were developed to reflect the intersection and intensity of implementation strategies (i.e., promotions, programs, policy influences, physical projects) across the following sectors: community design, active transportation, parks and recreation, and schools. Investigators used a standard threshold for "high" integration that required use of at least three of the four implementation strategies. This threshold aligned with the intention of the 5P Model and ensured greater consistency in analyzing integration across sectors. Table 1 provides most of the variables with associated operational definitions and descriptions or examples; Table 2 provides the types of partners.

Data Agreement

Simple assessments of agreement compared variables collected through the ALbD PRS and those collected through the evaluation focus groups and interviews. Each variable from the PRS data reflected counts of activities recorded by multiple staff or partners from each community partnership that had been checked for accuracy by the evaluation coordinator from the National Program Office. Each variable from the focus group and interview data reflected counts of activities reported by multiple staff, partners, or community members that had been coded by research assistants and checked for accuracy. Percentage agreement for four common variables captured in both data sets (i.e., high/low median-split variables based on counts of community assessments, programs, policy influences, and physical projects) was assessed.

Configural Frequency Analysis

Originally developed in psychology, CFA is a method of exploratory data analysis with large contingency tables used to detect clusters of cases that deviate from the overall associations among variables by occurring more (types) or less (anti-types) frequently than expected according to a base model.[22,32,33] The base model can take a variety of forms, but most often it is simply a model predicting frequencies in each cell based on the marginal distributions. The base model used for these analyses was the fitted log-linear model predicting cell frequencies from the variables.

Each configuration is a specific combination of values for categoric data variables. Most analyses of contingency tables seek to determine differences between predicted and observed cell *frequencies* in order to reject the hypothesis that the categoric variables can be used to predict the frequencies. Differences occur when cells have more or fewer cases than predicted, and not all cells need to deviate from the expected values in order to reject the hypothesis.

Configural frequency analysis is fundamentally different in that it seeks to determine which *cells* deviate from the expected frequencies. Types are cells with more than the expected numbers of cases according to the base model, whereas anti-types are cells with fewer than the expected numbers of cases. For example, if a type is defined by communities with (1) higher proportions of nonwhite racial and ethnic populations; (2) larger population sizes; and (3) more community design policy changes, then there were more communities in this configuration than would be predicted from the variables alone. The configuration highlights a difference for communities with (1) higher proportions of nonwhite racial and ethnic populations and (2) larger population sizes that may lead to (3) *more* community design policy changes.

To gain insight into the structure of relationships in the ALbD data, a comprehensive series of bivariate (2×2 or 2×3) and multivariate ($2 \times 2 \times 2$ or $2 \times 2 \times 3$) combinations of community characteristics, preparation efforts, and implementation activities were constructed for the analysis (see "Variables" above). Given the small sample size of 25 community partnerships, each analysis was limited to two or three variables with two or three levels in each of the variables in order to be able to detect types and anti-types.[34] Detecting types and anti-types is a way of identifying clusters of communities that may share the same underlying system. Bivariate analyses are not reported.

Results

Communities

More than half of the community partnerships (52%) worked in at least one community with a high proportion of people from nonwhite racial and ethnic populations. Twenty percent of community partnerships worked in at least one community with a high proportion of people in poverty. Most community partnerships (76%) worked with large populations in urban areas compared to less-populated urban or rural areas, yet the geographic scale of the work tended toward neighborhoods and communities (68% of community partnerships) as compared to metropolitan areas or counties. Twenty percent of community partnerships worked in states in the South, whereas other community partnerships worked in states in the West (32%), Midwest (28%), or Northeast (20%). Table 1 summarizes these community variables and ratings for the multivariate analyses.

Preparation (First of the 5Ps)

The preparation variables and ratings are briefly summarized below and listed in Table 1.

Leadership. Most lead agencies for the community partnerships represented nonprofit agencies (64%) followed by government agencies (28%) and private agencies (8%). Additionally, most of the lead agencies repre-

Table 1. Active Living by Design variables, definitions, examples, and ratings

Variables	Operational definitions	Descriptions or examples	Ratings (% communities)
Community			
Non-Caucasian race/ethnicity, %	High: ≥40 Low: <40	Proportion from non-Caucasian racial and ethnic groups (at least one subpopulation)	High (52)
Poverty, %	High: ≥40 Low: <40	Proportion of the population in poverty (at least one subpopulation)	High (20)
Population size, *n*	Large: ≥200,000 Small: <200,000	Density or concentration of people in the community	Large (76)
Geographic scale	Large: metro area/county Small: neighborhood/community	Physical size of the community	Large (32)
Region (U.S.)	South: location in southern states Non-South: location in other states	Non-South regions include Northeast, Midwest, and West	South (20)
Preparation			
Lead agency	Government agency Nonprofit organization Private organization	Examples: public health or planning department, community development corporation, advocacy organization	Government (28) Nonprofit (64) Private (8)
Number of core partners	High: ≥2 Low: <2 Range: 0–6	Partners involved in most design, planning, and implementation activities	High (56)
Number of partners	High: ≥35 Low: <35 Range: 22–84	Partners with direct or indirect involvement in the initiative	High (52)
Partnership capacity (dimensions rated "high")	High: ≥8 Low: <8	Ten dimensions: goal orientation, community representation, skills, resources, leadership, organization, conflict management, input, trust, participation	High (44)
Community capacity (dimensions rated "high")	High: ≥4 Low: <4	Five dimensions: community influence, broad influence, community awareness, perceived equity, perceived opposition	High (8)
Assessments, *n*	High: ≥10 Low: <10 Range: 4–46	Examples: surveys, audits, observations, interviews Assessment domains (yes/no): planning, transportation, parks/recreation, schools, health	High (48)
Resources generated, $	High: ≥2 million Low: <2 million Range: 471,425–97,170,712	Examples: capital improvements, grants, donations Resource domains (yes/no): planning, transportation, parks/recreation, schools	High (52)
Sustainability, number of types of strategies	High: ≥2 Low: <2	Four strategies: staff positions, committees appointed, residents involved in implementation, advocacy and implementation tools and resources	High (56)

(continued on next page)

Table 1. *(continued)*

Variables	Operational definitions	Descriptions or examples	Ratings (% communities)
Implementation			
Policy influences, number of changes	High: ≥8 Low: <8 Range: 1–23	Examples: street ordinance, park master plan Policy domains: planning (≥2/<2); transportation (≥3/<3); parks/recreation (≥2/<2); schools (≥2/<2)	High (48)
Physical projects, *n*	High: ≥11 Low: <11 Range: 2–21	Examples: new playground, sidewalk, or bike lane Project domains: planning (≥1/<1); transportation (≥4/<4); parks/recreation (≥3/<3); schools (≥2/<2)	High (48)
Promotions, *n*	High: ≥11 Low: <11 Range: 2–21	Examples: Bike to Work Month, Walk to School Day Promotion domains: community (≥7/<7); parks/recreation (≥1/<1); schools (≥2/<2)	High (48)
Programs, *n*	High: ≥8 Low: <8 Range: 3–16	Examples: Sunday Parkways, Walking School Bus Program domains: community (≥7/<7); parks/recreation (≥1/<1); schools (≥3/<3)	High (48)
Integration, number of Ps[a]			
Community design	High: ≥3 Low: other	Planning policy changes and physical projects, community walk/bike promotions and programs	High (16)
Active transportation	High: ≥3 Low: other	Pedestrian/bike/transit policy changes and physical projects, community walk/bike promotions and programs	High (28)
Parks and recreation	High: ≥3 Low: other	Parks and recreation policy changes, physical projects, promotions, and programs	High (20)
School	High: ≥3 Low: other	School policy changes, physical projects, promotions, and programs	High (36)

[a]The four implementation Ps include: promotions, programs, policy influences, and physical projects.

sented disciplines outside of health care and public health (68%).

Partnership. The majority of community partnerships (56%) had two or more core partners that shared decision-making and implementation responsibilities with the lead agency. About half of the community partnerships (52%) had an extended network of 35 or more partners engaged in community partnership activities. Forty-four percent of the community partnerships scored themselves high on eight of ten partnership capacity dimensions. See Baker et al.[35] in this *AJPM* supplement for more on the dimensions of the *Partnership Capacity Survey*. Most of the community partnerships had strong representation across sectors and disciplines (Table 2).

Community. Only two community partnerships (8%) scored themselves high on four of five community capacity dimensions (see Baker et al.[35] in this *AJPM* supplement for dimensions of the *Partnership Capacity Survey*). Forty-eight percent of the community partnerships had conducted eight or more community assessments, with fewer using community design or parks and recreation assessments and more using ac-

Table 2. Preparation and implementation variables by sector or discipline in Active Living by Design community partnerships (n=25)

	% of community partnerships						
Sector or discipline	Partners represented	Assessment	Resources generated	Policy changes	Physical projects	Promotions	Programs
Planning	76	40	0	56 (≥2 changes)	16 (≥1 projects)	48 (≥7 promotions)[a]	48 (≥7 programs)[a]
Transportation	84	84	76	44 (≥3 changes)	52 (≥4 projects)		
Parks and recreation	92	44	28	44 (≥2 changes)	52 (≥3 projects)	16 (≥1 promotion)	36 (≥1 programs)
School	96	64	16	36 (≥2 changes)	52 (≥2 projects)	56 (≥2 promotions)	48 (≥3 programs)
Health	96	84	—	—	—	—	—
Policy- or decision-makers	96	—	—	—	—	—	—
Advocacy	84	—	—	—	—	—	—
Community- or faith-based	100	—	—	—	—	—	—
Business	96	—	—	—	—	—	—

[a]Promotions and programs for the planning and transportation sectors refer to the same set of community walking and biking promotions and programs.

tive transportation and health assessments. Fifty-two percent of the community partnerships generated $2 million or more in new resources, with the majority generating active transportation resources. See assessments and resources generated in Table 2. Bors[28] and Bors et al.[36] in this *AJPM* supplement provide more data on community assessments and resources generated. Lastly, 56% of the community partnerships had two or more sustainability strategies (see Kraft and colleagues[37] in this *AJPM* supplement for a more detailed analysis).

Promotions and Programs (Second and Third of the 5Ps)

Promotional and programmatic efforts were combined at the community level, corresponding to community design and active transportation. Promotions and programs were less frequent in the parks and recreation domain compared with the other domains. See implementation variable ratings in Table 1 and promotions and programs in Table 2. Detailed information on promotions and programs is provided in Claus et al.[38] in this *AJPM* supplement.

Policy Influences and Physical Projects (Fourth and Fifth of the 5Ps)

The largest number of community partnerships had policy changes in the community design domain (e.g., land-use master plans, subdivision regulations), and the fewest had changes in the school domain (e.g., school-district wellness policies, school speed zones). Alternatively, very few community partnerships had community design physical projects (e.g., new mixed-use development). See implementation variables and ratings in Table 1 and policy influences and physical projects in Table 2. (See Evenson et al.[39] in this *AJPM* supplement for specific policy influences and physical projects.)

Integration and Data Agreement

Twenty percent of community partnerships received a high rating on total integration. For community design, few communities (16%) scored high on integration. In active transportation and parks and recreation, more communities scored high on integration (28% and 20%, respectively). The school domain had the greatest proportion of communities scoring high on integration (36%). Integration variables and ratings are also found in Table 1.

Comparing variables collected through the ALbD Progress Reporting System and the evaluation focus groups and interviews demonstrated that agreement was strongest for programs (84%); moderate for policy

changes (68%); weaker for physical projects (60%); and weakest for assessments (56%).

Multivariate Configural Frequency Analysis

From the multivariate CFAs, several types (i.e., greater number of community partnerships in a specified variable configuration than expected in the base model) and anti-types (i.e., fewer community partnerships in a configuration than expected in the base model) emerged related to the 5P strategies, and these configurations are summarized below.

Partnership capacity. Types: Community partnerships working in communities with a low proportion of nonwhite racial and ethnic populations and a small population scored low on partnership capacity ($\chi^2=12.61$, $p<0.001$). Similarly, community partnerships working in a community located outside southern states with a small population scored low on partnership capacity ($\chi^2=16.25$, $p<0.001$). To the contrary, community partnerships that scored high on partnership capacity included those working in at least one community with a high proportion of people in poverty located in southern states ($\chi^2=11.18$, $p<0.01$); those working with larger populations located in southern states ($\chi^2=16.25$, $p<0.001$); and those working in larger geographic areas located in southern states ($\chi^2=12.95$, $p<0.001$).

Anti-Types: No community partnerships scored high on partnership capacity with the following combined characteristics: a low proportion of people in poverty and a small population ($\chi^2=6.97$, $p<0.01$); a low proportion of people from nonwhite racial and ethnic populations and a small geographic scale ($\chi^2=10.41$, $p<0.01$); a small population and a small geographic scale ($\chi^2=8.70$, $p<0.01$); or a small population in states outside the South ($\chi^2=16.25$, $p<0.001$). In addition, no community partnerships scoring high on total assessments and low on sustainability strategies scored high on partnership capacity ($\chi^2=5.24$, $p<0.05$).

Community capacity. Types: Community partnerships that scored high on community capacity included those working in a large-scale geographic community with a small proportion of people from nonwhite racial and ethnic populations ($\chi^2=11.74$, $p<0.001$) and those working in a large-scale geographic community with a small proportion of people in poverty ($\chi^2=6.36$, $p<0.05$).

Anti-Types: No community partnerships scored high on community capacity with the following combined characteristics: a high proportion of people in poverty and a large geographic scale ($\chi^2=6.36$, $p<0.05$); a higher proportion of people in poverty in states in the South ($\chi^2=4.18$, $p<0.05$); or a small population in states in the South ($\chi^2=5.15$, $p<0.05$).

Community design strategies. Figure 1 provides the types and anti-types for community design; example configurations are described below.

Types: All nine types corresponded to configurations of community characteristics with three implementation strategies (i.e., policy changes, physical projects, and programs) and integration (i.e., high ratings for at least three of the four implementation strategies). Four of the nine types included policy changes (nos. 3, 7–9), and this is consistent with the policy focus of community design and planning. Community partnerships working with a high proportion of people from nonwhite racial and ethnic populations and people in poverty scored high on community design policy changes (no. 9, $\chi^2=14.66$, $p<0.001$); physical projects (no. 1, $\chi^2=10.60$, $p<0.01$); and integration (no. 2, $\chi^2=10.60$, $p<0.01$). Similarly, community partnerships working in a small-scale geographic community with a high proportion of people in poverty scored high on community design physical projects (no. 4, $\chi^2=7.85$, $p<0.01$) and integration (no. 5, $\chi^2=7.85$, $p<0.01$).

Anti-Types: No community partnerships working with a high proportion of people from nonwhite racial and ethnic populations and a small population scored high on community walking and biking promotions (no. 10, $\chi^2=4.67$, $p<0.05$) or programs (no. 11, $\chi^2=4.83$, $p<0.05$), and none of these partnerships scored low on community design physical projects (no. 29, $\chi^2=6.76$, $p<0.01$). Fewer community partnerships than expected worked with a low proportion of people in poverty at a small geographic scale and scored high on community design policies (no. 34, $\chi^2=8.55$, $p<0.01$); physical projects (no. 36, $\chi^2=7.85$, $p<0.01$); or integration (no. 37, $\chi^2=7.85$, $p<0.01$).

Active transportation strategies. Figure 2 provides the types and anti-types for active transportation; example configurations are described below.

Types: Community partnerships that conducted more assessments and worked on more sustainability efforts scored high on active transportation policy changes (no. 12, $\chi^2=11.30$, $p<0.001$) and physical projects (no. 13, $\chi^2=13.23$, $p<0.001$). Alternatively, community partnerships that did not have transportation partners and worked on fewer sustainability efforts scored low on active transportation policy changes (no. 11, $\chi^2=14.37$, $p<0.001$); active transportation physical projects (no. 7, $\chi^2=9.90$, $p<0.01$); and community walking and biking programs (no. 9, $\chi^2=9.33$, $p<0.01$); nevertheless, these community partnerships also scored high on community walking and biking promotions (no. 8, $\chi^2=9.90$, $p<0.01$). Community partnerships scoring high on community walking and biking promotions also scored low on active

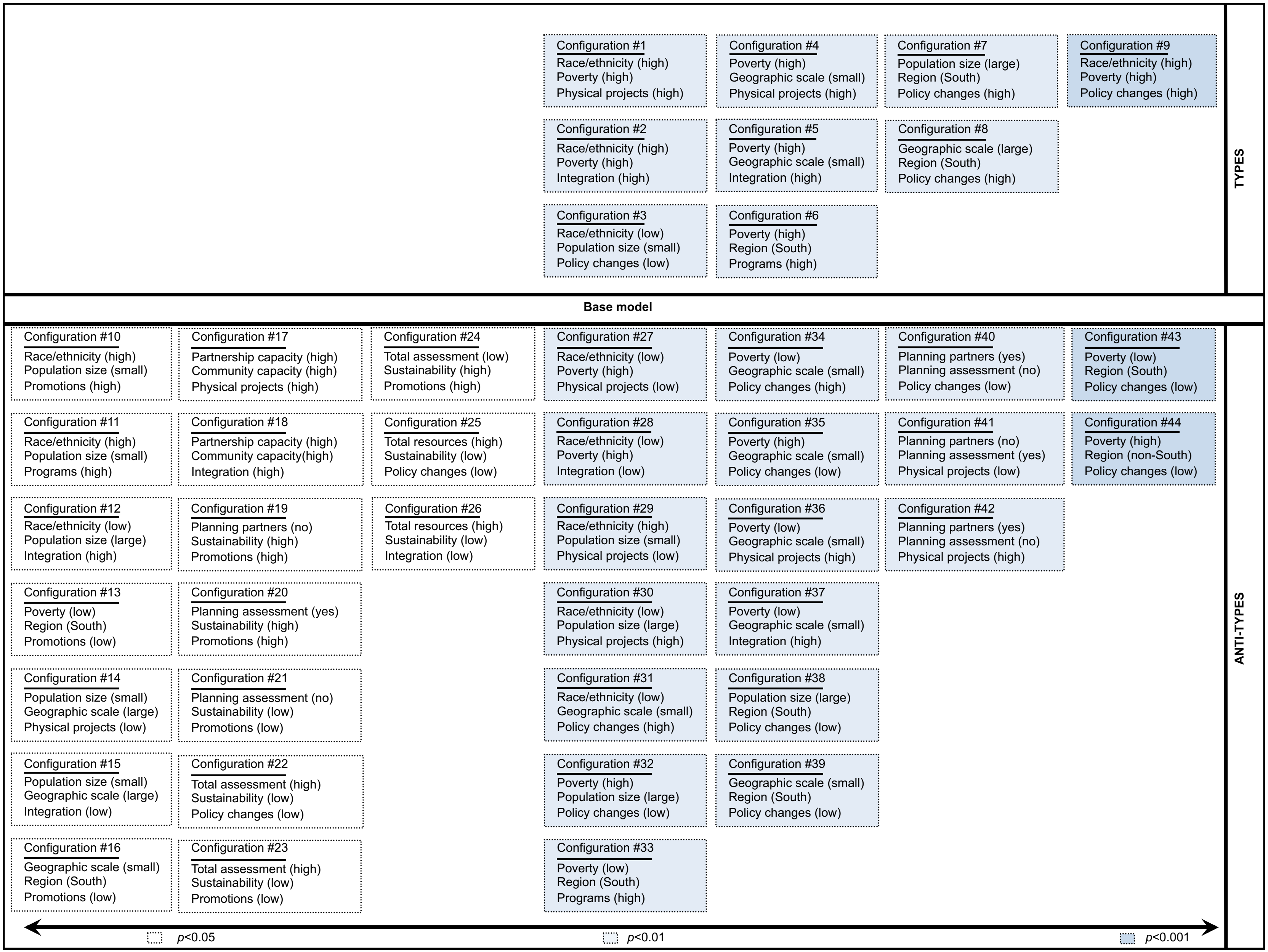

Figure 1. Configurations for community design approaches to active living

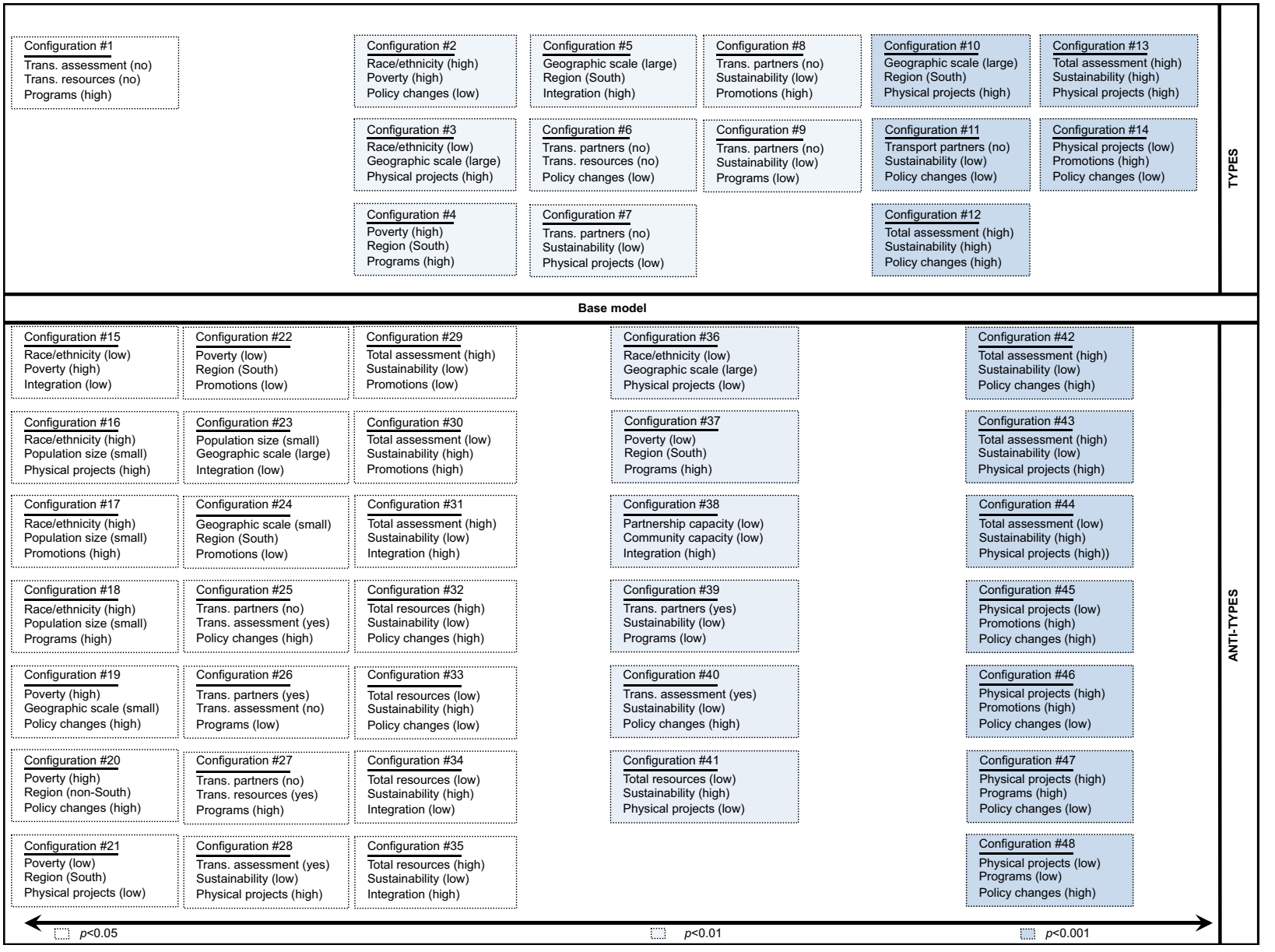

Figure 2. Configurations for active transportation approaches to active living
trans., transportation

transportation policies and physical projects (no. 14, $\chi^2=14.41$, $p<0.001$).

Anti-Types: Fewer community partnerships than expected scored low on active transportation physical projects while scoring high on active transportation policy changes and community walking and biking promotions (no. 45), and fewer scored low on active transportation policy changes while scoring high on active transportation physical projects and community walking and biking promotions (no. 46, $\chi^2=14.41$, $p<0.001$).

Parks and recreation strategies. Figure 3 provides the types and anti-types for parks and recreation; example configurations are described below.

Types: Community partnerships that had parks and recreation partners and generated parks and recreation resources scored high on parks and recreation policy changes (no. 2, $\chi^2=9.42$, $p<0.01$) and physical projects (no. 3, $\chi^2=10.54$, $p<0.01$). More community partnerships than expected scored high on parks and recreation physical projects, promotions, and programs (no. 6, $\chi^2=9.42$, $p<0.01$).

Anti-Types: No community partnerships working with a low proportion of people from nonwhite racial and ethnic populations and a high proportion of people in poverty scored low on parks and recreation promotions (no. 17, $\chi^2=10.37$, $p<0.01$); programs (no. 18, $\chi^2=9.50$, $p<0.01$); or integration (no. 41, $\chi^2=12.91$, $p<0.001$). Similarly, fewer community partnerships than expected were working with a high proportion of people from nonwhite racial and ethnic populations and a low proportion of people in poverty and scored low on parks and recreation promotions (no. 19, $\chi^2=10.37$, $p<0.01$); programs (no. 20, $\chi^2=9.50$, $p<0.01$); or integration (no. 40, $\chi^2=12.91$, $p<0.001$).

School strategies. Figure 4 provides the types and anti-types for schools; example configurations are described below.

Types: More community partnerships than expected scored high on school policy changes, physical projects, and promotions (no. 22, $\chi^2=15.95$, $p<0.001$); and more scored high on school physical projects, promotions, and programs (no. 26, $\chi^2=16.71$, $p<0.001$). In addition, community partnerships working with a high proportion of people from nonwhite racial and ethnic populations and people in poverty scored low on school physical projects (no. 8, $\chi^2=11.04$, $p<0.001$); promotions (no. 9, $\chi^2=11.76$, $p<0.001$); programs (no. 10, $\chi^2=16.47$, $p<0.001$); and integration (no. 11, $\chi^2=15.60$, $p<0.001$). Further, community partnerships that conducted school assessments and had more sustainability efforts scored high on school physical projects (no. 17, $\chi^2=14.32$, $p<0.001$) and programs (no. 18, $\chi^2=17.76$, $p<0.001$).

Anti-Types: Fewer community partnerships than expected were working with a high proportion of people from nonwhite racial and ethnic populations and a low proportion of people in poverty and scored low on school policy changes (no. 53, $\chi^2=13.33$, $p<0.001$); physical projects (no. 54, $\chi^2=11.04$, $p<0.001$); programs (no. 54, $\chi^2=16.47$, $p<0.001$); or integration (no. 41, $\chi^2=15.60$, $p<0.001$). Fewer community partnerships than expected without school assessments conducted or school resources generated scored high on school physical projects (no. 63, $\chi^2=14.08$, $p<0.001$) or programs (no. 64, $\chi^2=11.84$, $p<0.001$).

Cumulative Promotions, Programs, Policy Influences, Physical Projects, and Integration

Several types and anti-types emerged from these analyses, and this section presents some example types. For policy changes, community partnerships working with a low proportion of people from nonwhite racial and ethnic populations and people in poverty scored low on total policy changes ($\chi^2=11.30$, $p<0.001$). Likewise, community partnerships with a low proportion of people from nonwhite racial and ethnic populations and a small population scored low on total policy changes ($\chi^2=14.40$, $p<0.001$). Community partnerships scoring high on total promotions and programs scored low on total policy changes ($\chi^2=9.06$, $p<0.01$).

With respect to physical projects, community partnerships with a lead agency from the private sector and fewer leadership changes scored high on total physical projects ($\chi^2=8.34$, $p<0.05$). Concerning promotions, community partnerships that conducted more overall assessments and had more sustainability efforts scored high on total promotions ($\chi^2=9.09$, $p<0.01$). For programs, community partnerships working in large-scale geographic communities located in southern states scored low on total programs ($\chi^2=8.96$, $p<0.01$). Finally, community partnerships working with a high proportion of people from nonwhite racial and ethnic populations and people in poverty scored low on overall integration of strategies ($\chi^2=9.46$, $p<0.01$). Yet, community partnerships that conducted more overall assessments and had more sustainability efforts scored high on overall integration of strategies ($\chi^2=16.99$, $p<0.001$).

Discussion

With limited understanding in the field related to the implementation of comprehensive community-level interventions to increase active living, this exploratory evaluation used innovative methods to elicit configurations of community characteristics, preparation efforts, and implementation strategies occurring more (types) and

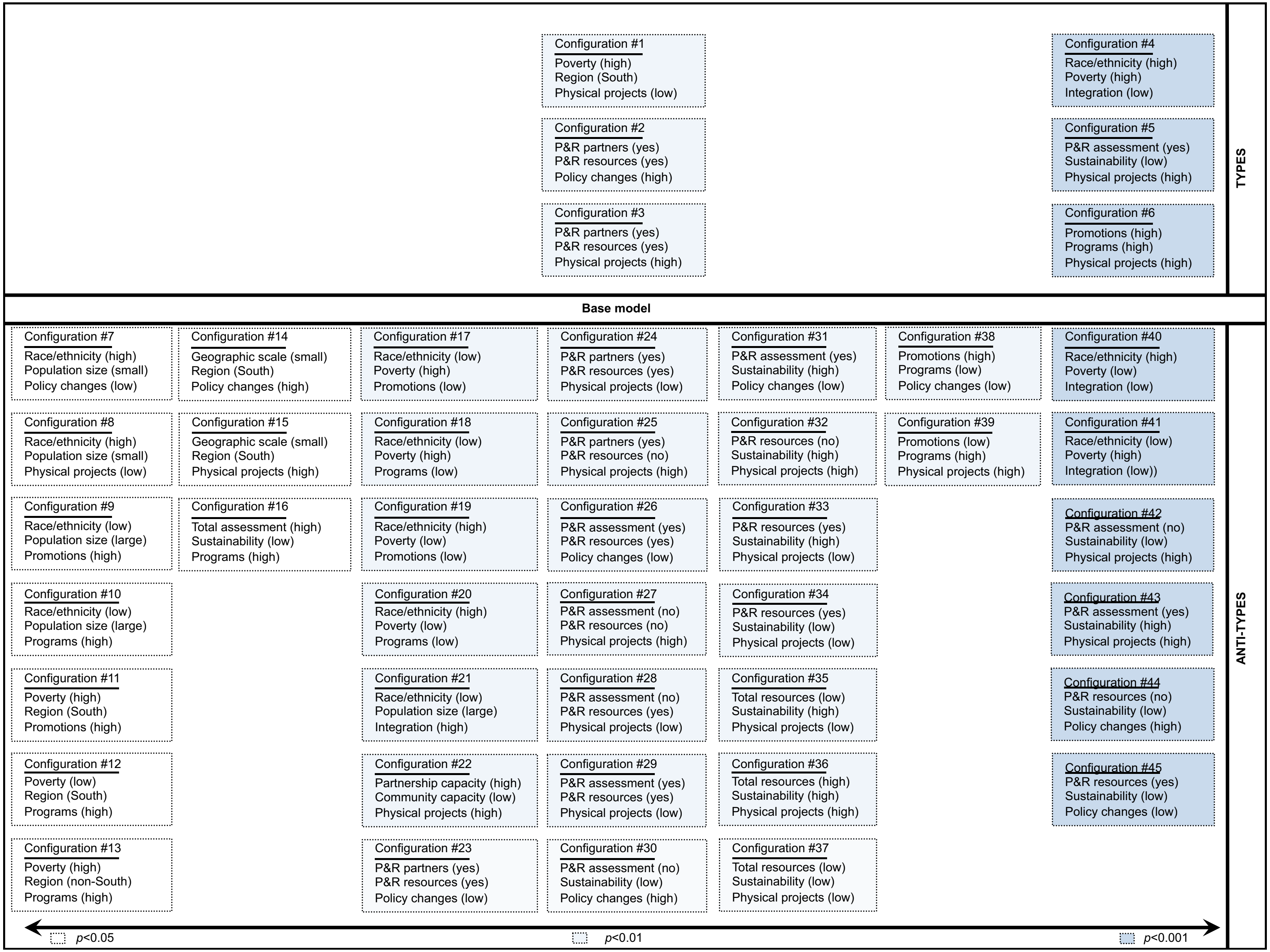

Figure 3. Configurations for parks and recreation (P&R) approaches to active living
P&R, parks and recreation

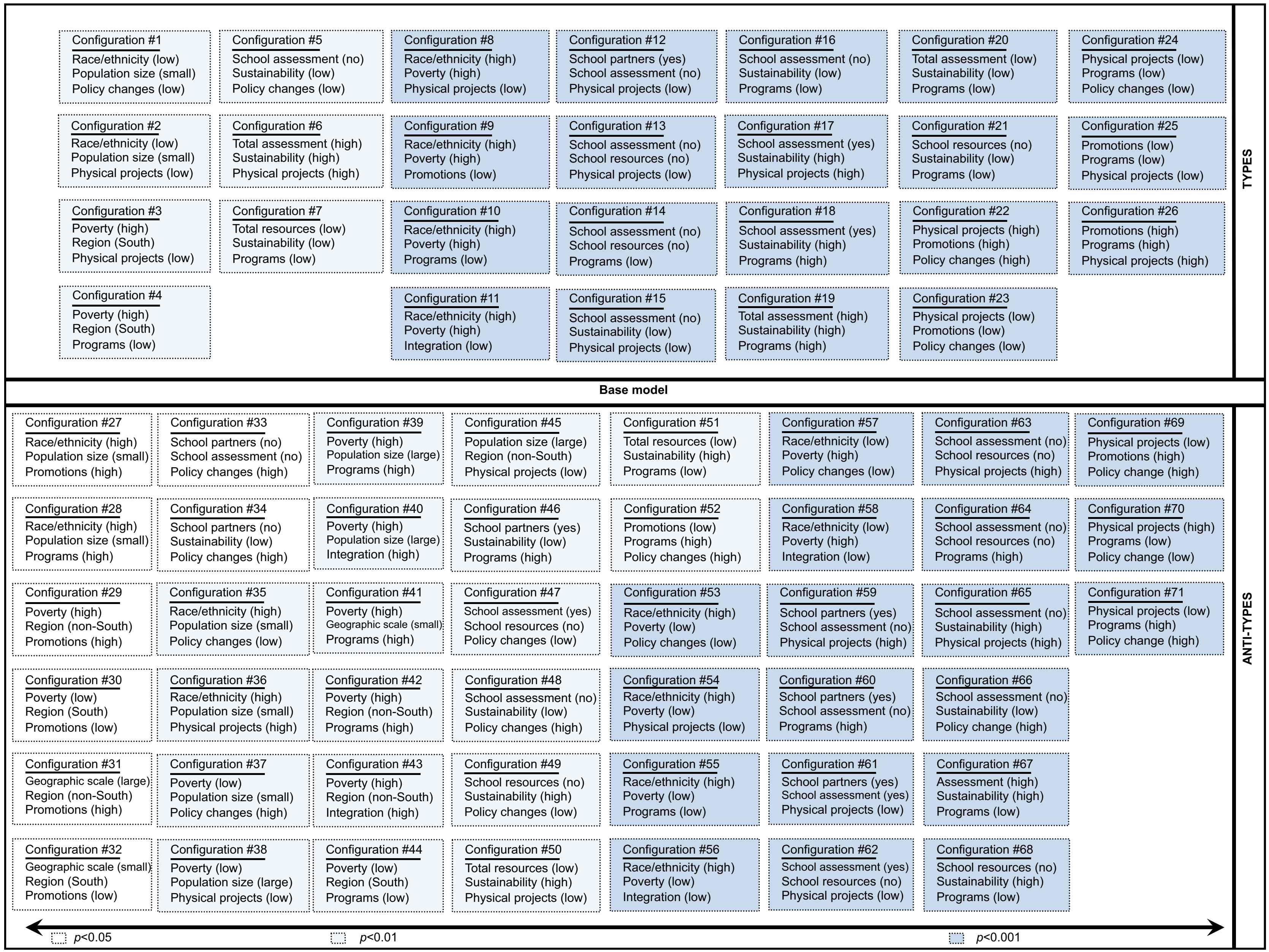

Figure 4. Configurations for school approaches to active living

less (anti-types) frequently than expected across 25 ALbD community demonstration projects. The evaluation launches new areas of inquiry for further investigation by the field, including (1) how to measure partnership and community capacity, community assessment, resources generated, sustainability, and implementation of promotions, programs, policies, and physical projects; (2) how to standardize methods for ongoing data collection and tracking at the community level, such as online progress reporting, interviews, and focus groups; (3) how to implement systematic data reduction procedures to condense complex, highly contextualized qualitative and quantitative data; and (4) how to extract common themes across communities using systems science analytic techniques to build the evidence base.

Overall, findings supported the ALbD Community Action Model[16] as community partnerships with more preparation activities (i.e., assessment, sustainability) implemented a larger number of active living promotions, programs, policy changes, and physical projects, cumulatively (type). Yet, community partnerships working in communities with more than 40% of the population from a nonwhite racial and ethnic background and greater than 40% of the population in poverty implemented fewer active living promotions, programs, policy changes, and physical projects, cumulatively (type).

Configural Frequency Analysis Methods

To increase understanding of underlying systems or patterns associated with cases as opposed to variables, CFA has been applied to a range of public health–related problems, including adolescent alcohol consumption patterns,[40] stress associated with intimate partner violence,[41] and risk of unintentional injury in children,[42] among others. The resulting types and anti-types provide insight into differences beyond chance that appear across cases from what is expected according to a base model. Emerging methods from systems science may help to elicit causal structure from various community configurations, including innovative community participatory methods of data collection and analysis through group model-building.[43,44]

Understanding the Role of Policy Change in the Configurations

Policy changes, including formal (e.g., resolutions, ordinances, regulations, permits, charter amendments, rights-of-way, agreements) and informal (e.g., planning products, guidelines, regional blueprints, land acquisition, mayors' initiatives) rules and procedures, presented some exceptions to the overall strategy patterns. Community partnerships with fewer policy changes had greater numbers of promotions and programs, so policy changes were not as likely to be tied to integrated approaches to active living. In part, this may be due to the fact that policy changes may get adopted (e.g., a tax increase to support parks and recreation), but funds may not be appropriated to support changes to the built environment (e.g., playground construction) or other promotional and programmatic efforts (e.g., youth sports leagues). In these cases, the policy change itself is insufficient to produce the desired changes in physical activity behavior.

Alternatively, changes to the built environment (e.g., striping for crosswalks and bike lanes) as well as promotional and programmatic activities (e.g., Mayor's Bike to Work Day) may be underway without a policy to support the changes (e.g., Complete Streets resolution). Under these circumstances, the infrastructure to support physical activity may get developed in a slower, piecemeal fashion that may not provide sufficient access and endorsement throughout the community.

In addition, community partnerships working with a low proportion of people from nonwhite racial and ethnic populations and people in poverty had lower numbers of policy changes. This was also true for community partnerships working with populations that were less racially and ethnically diverse as well as smaller populations. Thus, while the cumulative dose of promotions, programs, and physical projects may be less prevalent than expected in poor, racially and ethnically diverse communities, cumulative policy changes may be less frequent in relatively wealthier or less-dense communities with less racial and ethnic diversity. This may indicate that communities with fewer policy changes already have a healthy policy environment, thus mitigating the need for new policy changes. These findings are consistent with those from another study that more policy action corresponded to higher obesity rates.[45]

Patterns for Various Active Living Settings

Community design approaches similarly deviated from the overall pattern. In addition to the inverse relationship of policy changes to promotions and programs, this is likely attributable to the extremely low prevalence of community design physical projects (e.g., mixed-use developments,[46] reduced block lengths in subdivisions[47]). Although three quarters of community partnerships did engage planning partners, this was the least-represented discipline (Table 2). Community design strategies were more prevalent than expected in poorer, racially and ethnically diverse communities and large-scale geographic communities with higher rates of poverty. This may be a function of two factors: (1) areas designated for new development, as opposed to redevelopment, are more common in poorer, blighted communities and (2) new develop-

ment projects can more easily integrate active living design principles than redevelopment projects.

For active transportation, more policy changes coincided with more physical projects, particularly for communities with a government lead agency. In these cases, it is likely that partners from planning and transportation departments led or were involved integrally in policy development and implementation; these efforts are inherent in the responsibilities of these agencies and increased the likelihood of success. On the other hand, community partnerships with more community walking and biking promotions were less likely to have active transportation policy changes, physical projects, or partners. This suggests the need for multidisciplinary partnerships to capitalize on the policy and built-environment expertise of transportation agencies as well as the planning, organizing, and communications expertise of other partners (e.g., health departments, community-based organizations) to increase awareness and use of the environments.

With respect to parks and recreation, integrated approaches incorporating promotions, programs, and physical projects occurred less frequently in poorer, racially and ethnically diverse communities. Similarly, communities in southern states with higher rates of poverty had fewer parks and recreation physical projects. On the other hand, community partnerships with parks and recreation partners and more resources had more policy changes and physical projects. Many plausible explanations exist for these patterns, including the possibility that communities with a lower tax base may be less likely to have sufficient resources to support facility development or maintenance as well as adequate staff for programming or park security.

Schools implemented the most integrated approaches across promotions, programs, policy influences, and physical projects. School-scale initiatives may benefit from having a well-defined population and environment as well as an organizational infrastructure that increases the likelihood of comprehensive interventions. Yet, community partnerships working in less-dense, less racially and ethnically diverse communities had fewer policy changes and physical projects. Similar to parks and recreation, this may be a reflection of communities with a lower tax base (i.e., fewer residents in this case) having fewer resources available for schools. This is reinforced by related findings that (1) community partnerships that did not conduct school assessments or generate school resources had fewer physical projects and programs and (2) community partnerships generating fewer collective or school-specific resources and working on fewer sustainability efforts had fewer programs.

A Look at Partnership and Community Capacity

Communities in southern states tended to have higher self-reported partnership capacity, particularly those with higher rates of poverty, greater population density, and larger geographic areas. Alternatively, community partnerships working with smaller, less racially and ethnically diverse populations had lower partnership capacity. Existing studies examining multisectoral partnerships for population health and health equity tend to focus more on intervention implementation and less on partnership capacity.[48] Additional investigation is needed to explain how and why different multisectoral partnerships may have greater collaboration, more-representative participation, or better resource mobilization.

Community partnerships working in larger geographic areas with less racial and ethnic diversity had higher community capacity. Very few community partnerships rated themselves high on the dimensions of community capacity assessed in this evaluation. More-intensive assessment and analysis of the dimensions of community capacity are needed (see Baker et al. article in this *AJPM* supplement).[35] Community partnerships with governmental lead agencies had higher self-reported partnership and community capacity. Reasons for these findings may be that these agencies may have access to greater resources, better connections to policymakers and decision makers, established relationships with community residents, or other characteristics that were perceived as important to influencing active living.

Limitations

Even though ALbD was a multiyear national program, baseline data on physical activity were not collected so no conclusions can be drawn about behavior changes over time in the communities (this limitation is described in detail in a companion article[27] in this *AJPM* supplement). In addition, all of the analysis has been conducted at the site level. Because there were only 25 communities funded through this initiative, the generalizability of the findings to other comparable initiatives and communities requires further study. Although the National Program Office and the evaluation team used multiple data collection methods and rigorous validation procedures,[27,28] the integrity of the data relied on responses from Project Directors and Project Coordinators that were likely influenced by these individuals' time available for reporting; their memory of different activities, related projects, or initiatives implemented at the same time; leadership turnover; and/or changes in the lead agency.

Several factors still need to be considered in the interpretation of intervention dose, including quality and timing of implementation (e.g., how well the policy change

was enforced or the physical project was designed or constructed); scale of the intervention (e.g., community-wide ordinances versus guidelines implemented in schools); and reach or exposure to the intervention by the overall population and various subpopulations. Ongoing work to expand and refine these types of variables and associated measures is needed. From a methods perspective, two systems can differ (or be similar) for any number of reasons, including chance. Use of CFA helps to address some of these concerns, yet more advanced CFA methods or simulation modeling may be necessary to ensure the configurations are not masked by covariates or other mediating factors.[49]

Conclusion

As an exploratory evaluation, the findings provide more questions to the field than answers. Some practical areas of inquiry for those working to improve active living or build the evidence for active living interventions include the following:

- What measures, tools, and resources are needed to systematically assess and evaluate community characteristics, preparation efforts, and implementation strategies?
- What other measures or tools are needed to capture the reach, scale, and implementation quality of promotions, programs, policy influences, and physical projects?
- How can new analytic approaches aid in understanding the complex inter-relationships of policy development, implementation, and enforcement within the context of community characteristics and social determinants of health?
- How does highly contextualized information within communities get translated into meaningful causal explanations across communities that produce insights for the field?
- How might the CFA methods reported in this article be applied to other communities in a variety of geographic settings?

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