Systems Thinking in Communities:

Understanding the Causes of Inactivity, Poor Diet/Nutrition, and Childhood Obesity in New Orleans, Louisiana

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Acknowledgments

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Introduction

KidsWalk Coalition is one of 49 community partnerships participating in the national *Healthy Kids, Healthy Communities* program of the Robert Wood Johnson Foundation (www.healthykidshealthycommunities.org). The purpose of this *KidsWalk Coalition* project was to introduce systems thinking at the community level by identifying the essential parts of the New Orleans, Louisiana system and how the system influences policy and environmental changes to promote healthy eating and active living as well as to prevent childhood obesity. To accomplish this goal, community partners participated in a group model building session and discussions. The group model building exercises were designed by staff from Transtria LLC and the Social System Design Lab at Washington University in St. Louis, Missouri as part of the *Evaluation of Healthy Kids, Healthy Communities* funded by the Robert Wood Johnson Foundation. These exercises actively involved a wide range of participants in modeling complex systems and provided a way for different representatives (e.g., government agencies, community-based organizations, policy/advocacy organizations, research organizations, universities) to better understand the systems (i.e., dynamics and structures) in the community (see the *Healthy Kids, Healthy Communities Group Model Building Facilitation Handbook*, www.transtria.com/hkhc). Overall, the evaluation was designed to assess policy, system, and environmental changes as a result of the community partnerships' efforts to increase healthy eating and active living in order to reduce childhood obesity.

New Orleans, Louisiana: Background and Local Participation

New Orleans is the largest city in the state of Louisiana, divided into 17 wards. New Orleans covers 4,190 square miles and sits 90 miles north from the mouth of the Mississippi River. New Orleans city proper, shaped like a crescent (thus the nickname the Crescent City), is surrounded by water: Mississippi River, Lake Pontchartrain, and Lake Borgne. The city is still recovering from Hurricane Katrina (2005); both a key challenge and opportunity for New Orleans. Infrastructure damage and population displacement are a direct result of the flooding from the storm. The population in New Orleans has declined nearly 29% since 2000, in large part due to Katrina. However, federal funds for rebuilding streets, parks, schools, and other public facilities were made available at the city level. According to the Greater New Orleans Community Data Center, by 2013, just over half of New Orleans 72 neighborhoods had recovered more than 90% of the population they had before the levees failed. Only three neighborhoods have less than half the population they had prior to Katrina, including the Lower Ninth Ward, which was the most heavily damaged neighborhood of all when the levees failed.

KidsWalk Coalition was founded with a mission of reversing the childhood obesity epidemic in New Orleans by making walking and bicycling safe for children and families to access schools, healthy eating choices, and other neighborhood destinations. The coalition was a local partnership of government agencies, public health, transportation, and community organizations dedicated to improving the health of New Orleanians by creating opportunities for physical activity in order to reduce childhood obesity among low-income children. The KidsWalk Coalition worked directly with the New Orleans Department of Public Works to make New Orleans' streets and sidewalks safer and more accommodating for pedestrians and bicyclists.

Prevention Research Center (PRC) at Tulane University was the lead agency for the KidsWalk Coalition partnership. Tulane University Prevention Research Center (PRC) is a Centers for Disease Control and Prevention-funded center that addresses the impact of the physical and social environment on obesity; involved the local community in research; encouraged policy and environmental changes that improve the health of the community; and provided training for public health professionals and community members. Key staff members from the PRC served in a lead role for the project, as Project Director, and strategic roles in policy and advocacy, training and communications, and community outreach.

KidsWalk Coalition's Priorities and Strategies

The partnership and capacity building strategies of *KidsWalk Coalition* included:

- **Complete Streets Advisory Committee:** The Department of Public Works convened the first ever city-wide Complete Streets Advisory Committee in July 2013. The purpose of the advisory committee was to advise the city on the implementation and management of the Complete Streets program, including goals, metrics, procedures, and public engagement.

The healthy eating and active living strategies of *KidsWalk Coalition* included:

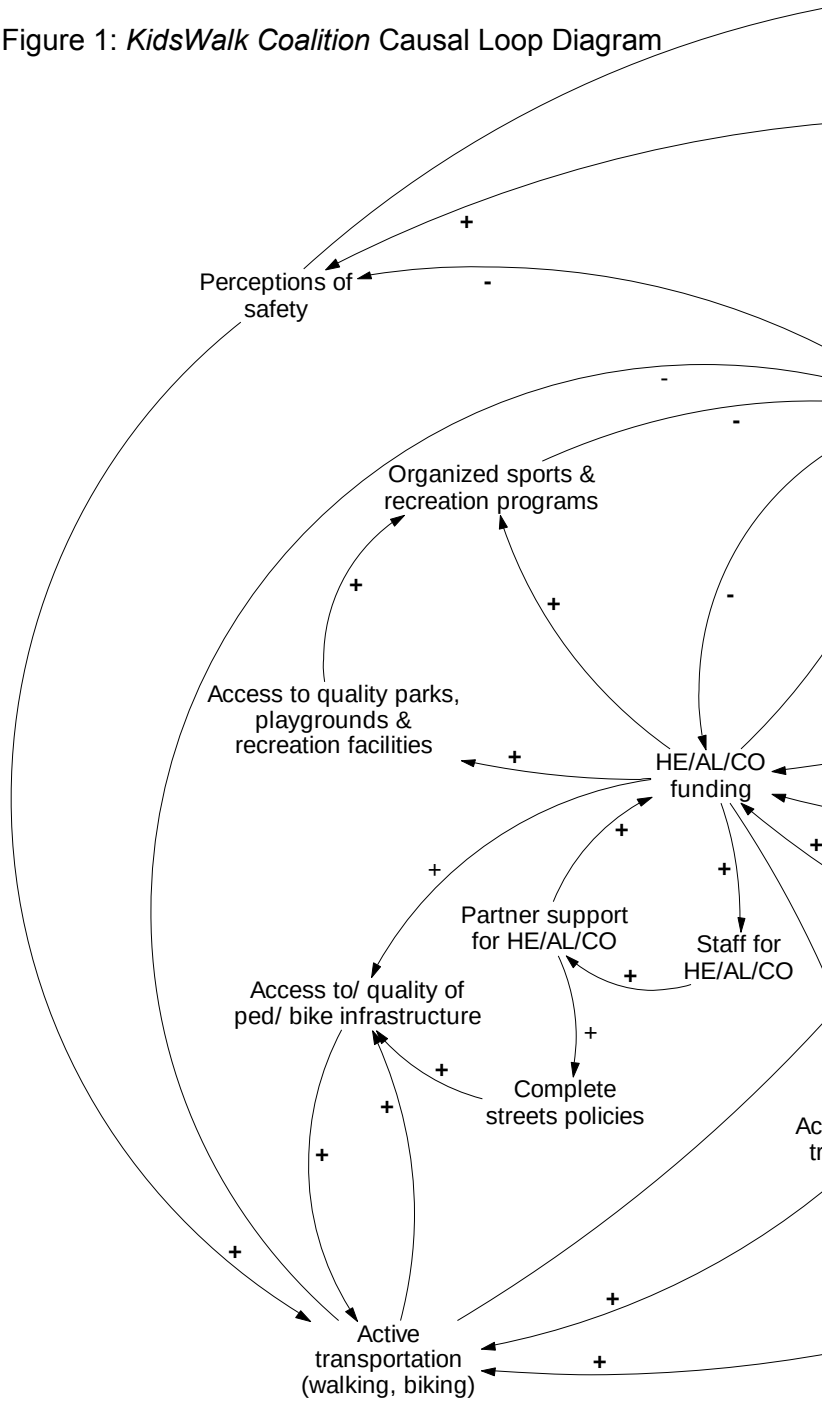
- **Active Transportation:** Efforts for this initiative focused on passing a Complete Streets Policy and beginning implementation of infrastructure improvements. Safe Routes to School planning and infrastructure grants were received by three schools in Orleans Parish, and environmental changes (e.g., new signage and crosswalk painting) were implemented.

For more information on the partnership, please refer to the New Orleans case report (www.transtria.com/hkhc).

Systems Thinking in Communities: New Orleans, Louisiana

"Systems thinking" represents a range of methods, tools, and approaches for observing the behaviors of a system (e.g., family, community, organization) and how these behaviors change over time; changes may occur in the past, present, or future. Figure 1 illustrates a system of policies, environments, local collaborations, and social determinants in New Orleans, Louisiana that influence healthy eating, active living, and, ultimately, childhood obesity. This system and the dynamics within the system are complicated with many different elements interacting.

Figure 1: *KidsWalk Coalition* Causal Loop Diagram



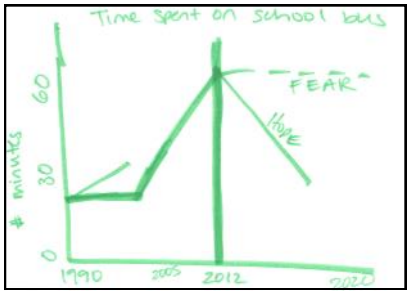
Models, such as Figure 1, provide a way to visualize all the elements of the system and their interactions, with a focus on causal relationships as opposed to associations. Through the model, specific types of causal relationships, or feedback loops, underlying the behavior of the dynamic system, can be identified to provide insights into what is working or not working in the system to support the intended outcomes (in this case, increases in healthy eating and active living, and decreases in childhood overweight and obesity). In system dynamics, the goal is to identify and understand the system feedback loops, or the cause-effect relationships that form a circuit where the effects "feed back" to influence the causes.

Group Model Building

Members of the *KidsWalk Coalition* partnership participated in a group model building session in April, 2012 and generated this system. also referred to as a causal loop diagram (Figure 1). Participants in the group model building session included representatives from government agencies, community-based organizations, policy/advocacy organizations, research organizations, and universities. The group model building session had two primary activities: 1) a Behavior Over Time Graph exercise; and 2) a Causal Loop Diagram (or structural elicitation) exercise.

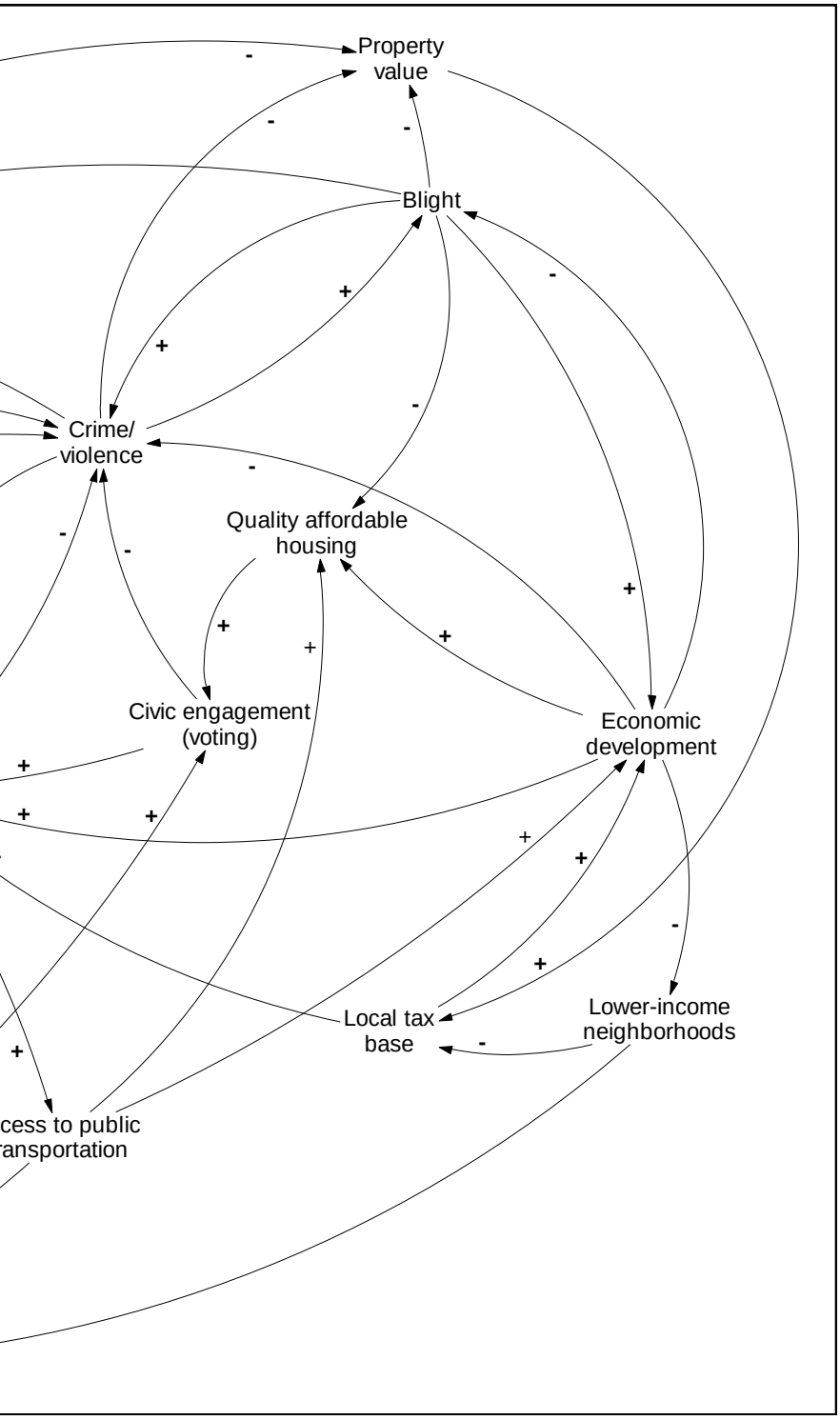
<u>Behavior Over Time Graphs</u>

To identify the range of things that affect or are affected by policy, system, and environmental changes in New Orleans related to healthy eating, active living, and childhood obesity, participants designed graphs to name the influences and to illustrate how the influences have changed over time (past, present, and future). In this illustration for time spent on the school bus, the number of minutes has increased dramatically over the last ten years and the participant hopes that this increasing trend will reverse into the future.



Each graph is a tool to increase the use of common, specific language to describe *what* is changing in the community as well as *when*, *where*, and *how* it is changing.

The graphs capture participants' perceptions of the influence, or variable, and through the graph, the participant tells their story. These perceptions are based on actual data or evidence, or they are part of the participants' lived experience.



Causal Loop Diagram

To examine the relationships among the variables from the behavior over time graphs, participants worked together and with facilitators to develop a causal loop diagram. In Figure 1, the words represent variables of quantities that can increase and decrease over time (i.e., the behavior over time graphs). These variables are influenced by other variables as indicated by the lines with arrows. The lines with arrows represent causal relationships - this is what is known about the system and how it behaves.

One feedback loop is: healthy eating (HE)/ active living (AL)/ childhood obesity (CO) funding → organized sports and recreation programs → crime/ violence → HE/AL/CO funding.

What is important to notice is that there are other feedback loops interacting simultaneously to influence or to be influenced by HE/AL/CO funding. Some variables may increase HE/AL/CO funding while other variables limit it. Determining the feedback loop or loops that dominate the system's behavior at any given time is a more challenging problem to figure out, and ultimately, requires the use of computer simulations.

Based on this preliminary work by the *KidsWalk Coalition* partnership, this "storybook" ties together the behavior over time graphs, the participants' stories and dialogue, and feedback loops from the causal loop diagram to understand the behavior of the system affecting health in New Orleans, Louisiana and to stimulate greater conversation related New Orleans' theory of change, including places to intervene in the system and opportunities to reinforce what is working. Each section builds on the previous sections by introducing concepts and notation from systems science.

Causal Loop Diagram for the Childhood Obesity System

The causal loop diagram (CLD) represents a holistic system and several subsystems interacting in New Orleans, Louisiana. In order to digest the depth and complexity of the diagram, it is helpful to examine the CLD in terms of the subsystems of influence. Because of this project's focus on healthy eating, active living, and childhood obesity, this system draws attention to a number of corresponding subsystems, including: healthy eating policies and environments (red), active living policies and environments (blue), health and health behaviors (orange), partnership and community capacity (purple), and social determinants (green).

From the group model building exercises, several variables and causal relationships illustrated in Figure 2 were identified within and across subsystems. This section describes the subsystems in the CLD.

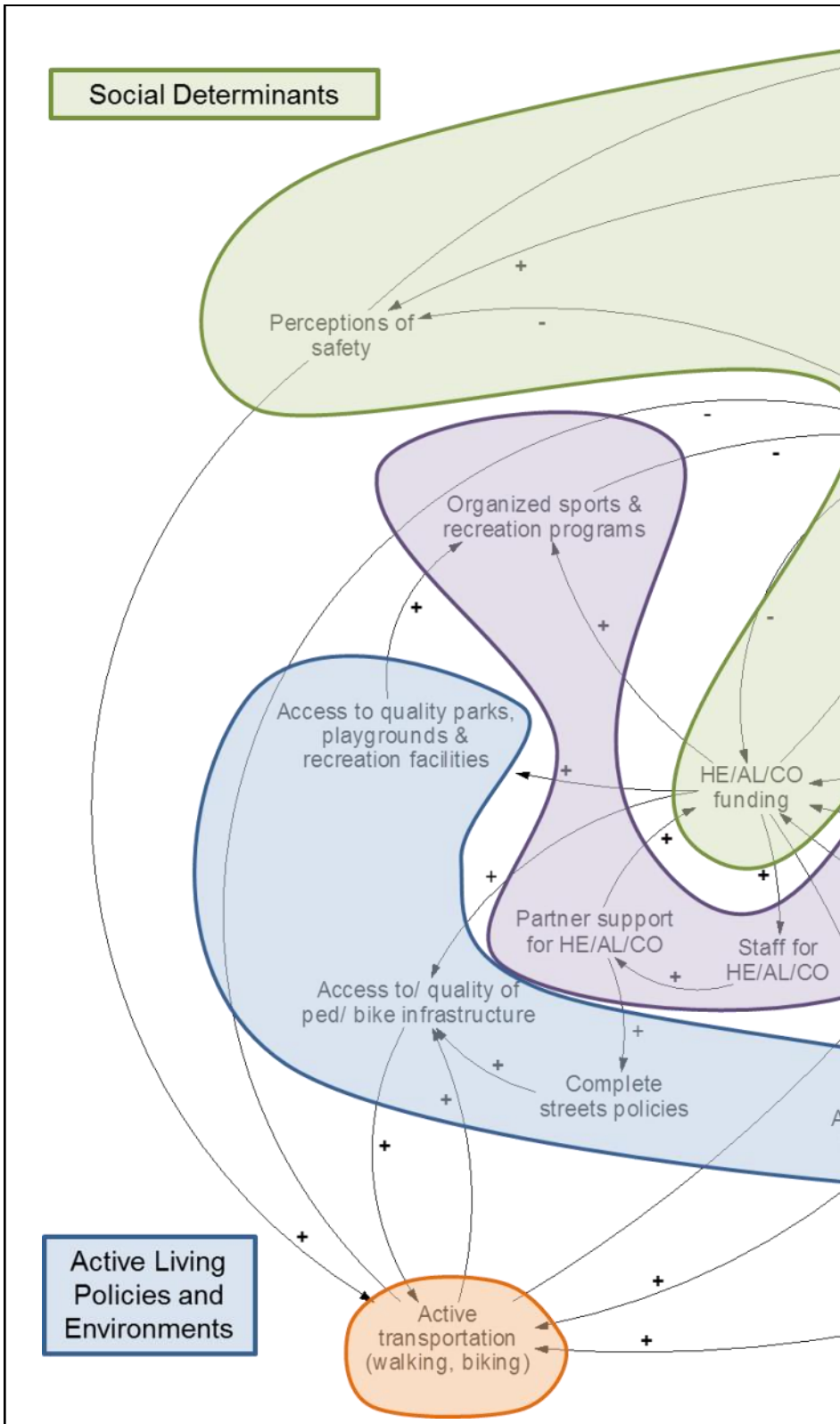


Figure 2: Subsystems in the *KidsWalk Coalition* Causal Loop Diagram

<u>Healthy Eating Policies and Environments (not represented in this model)</u>

The healthy eating policy and environmental subsystem includes food production, food distribution and procurement, and food retail. During the behavior over time graphs exercise, the participants generated 3 graphs related to policy or environmental strategies or contexts that affected or were affected by the work of the *KidsWalk Coalition*. These variables, represented in the participants' conversations from the behavior over time graph exercise, did not appear in the causal loop diagram exercise.

<u>Active Living Policies and Environments (Blue)</u>

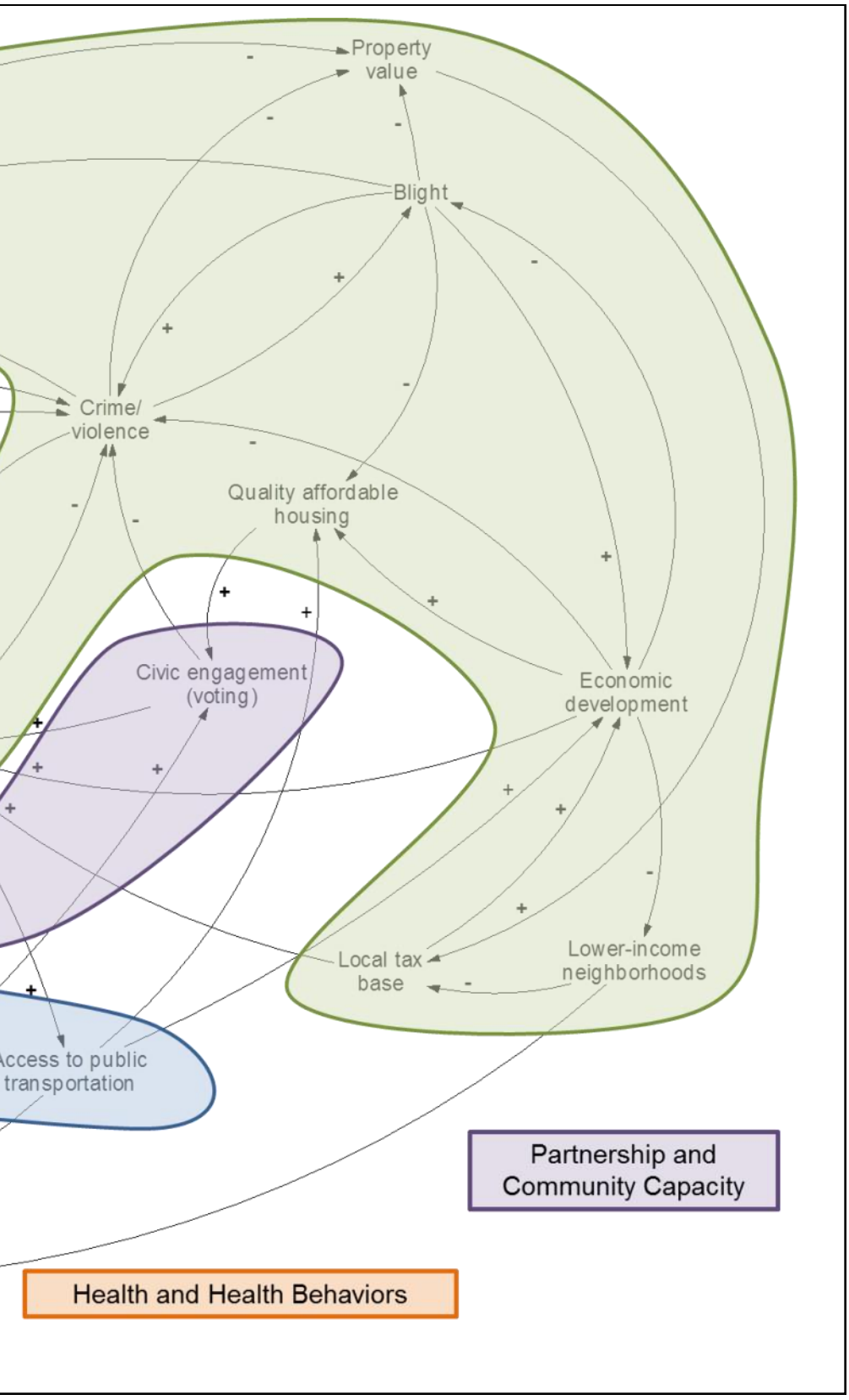
The active living policy and environmental subsystem includes design, planning, construction, and enforcement or maintenance related to access to opportunities for active transportation and recreation. For this topic, the group model building participants developed 21 graphs related to policy or environmental strategies (e.g., Complete Streets policy) or contexts (e.g., access to public transportation, access to quality parks, playgrounds, and recreation facilities) that affected or were affected by the partnership's work.

<u>Health and Health Behaviors (Orange)</u>

The subsystem for health and health behaviors includes health outcomes (e.g., obesity), health behaviors (e.g., healthy eating, physical activity), and behavioral proxies or context-specific behaviors (e.g., active transportation such as walking or biking).

Partnership and Community Capacity

The partnership and community capacity subsystem refers to the ways communities organized and rallied for changes to the healthy eating and active living subsystems. For instance, the *KidsWalk Coalition* increased partners' support for active living through a Complete Streets Advisory Committee. This subsystem also includes community factors outside the partnership that may influence or be influenced by their efforts, such as civic engagement.



Social Determinants

Finally, the social determinants subsystem denotes societal conditions (e.g., local tax base, quality, affordable housing) and psychosocial influences (e.g., perceptions of safety) in the community that impact health beyond the healthy eating and active living subsystems. In order to achieve health equity, populations and subgroups within the community must have equitable access to these resources and services.

Each one of these subsystems has many more variables, causal relationships (arrows), and feedback loops that can be explored in greater depth by the *KidsWalk Coalition* partners or by other representatives in New Orleans, Louisiana. Using this CLD as a starting place, community conversations about different theories of change within subsystems may continue to take place.

The next sections begin to examine the feedback loops central to the work of *KidsWalk Coalition*. In these sections, causal relationships and notations (i.e., arrows, "+" signs, "-" signs) from Figure 2 will be described to increase understanding about how systems thinking and modeling tools can work in communities to increase understanding of complex problems that are continuously changing over time, such as childhood obesity. At the end of this CLD storybook, references to other resources will be provided for those interested in more advanced systems science methods and analytic approaches.

Active Transportation Feedback Loop

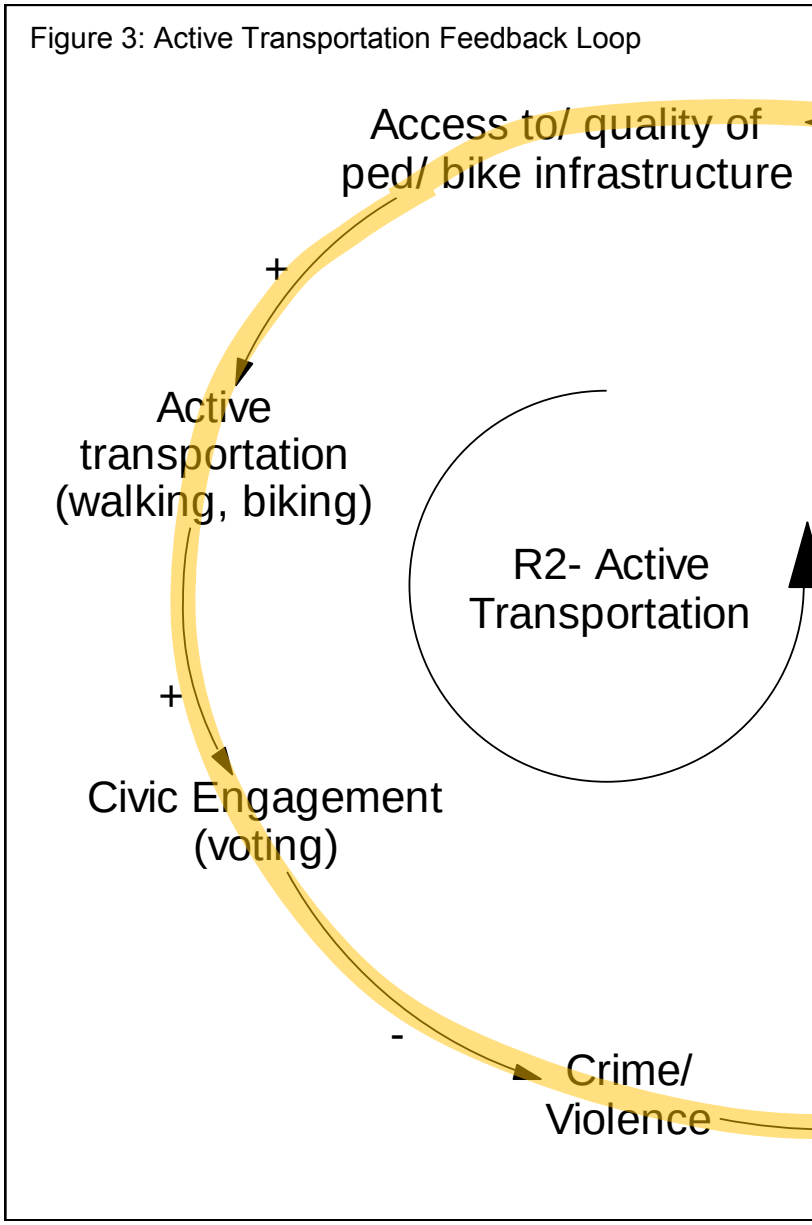
To simplify the discussion about feedback loops, a couple of loops drawn from the *KidsWalk Coalition* CLD (see Figures 1 and 2) are shown in Figure 3. While the CLD provides a theory of change for the childhood obesity prevention movement in New Orleans, Louisiana, each feedback loop tells a story about a more specific change process.

Causal Story for Feedback Loop

Story A: In this case , the story is about the active transportation (orange highlighted loop in Figure 3). New Orleans, Louisiana partners passed a Complete Streets Policy, began implementation of infrastructure improvements, worked on Safe Routes to School planning and infrastructure improvements in three schools in Orleans Parish, and completed several other environmental changes (e.g., new signage, crosswalk painting). Participants described how Complete Streets policies improve access to quality pedestrian and bike infrastructure, increasing active transportation. In turn, walking and biking in and around the community improves civic engagement and, consequently, reduces crime and violence. As these positive changes are made, fewer personnel and financial resources need to be invested in Complete Streets policies (as the policies and environments are already in place).

Story B: While the preceding story reflected a positive scenario for New Orleans, Louisiana, the same feedback loop also tells the opposite story. Without Complete Streets policies and quality pedestrian and bike infrastructure, fewer people can walk and bike safely in the community. As more people use automobile transportation, there is less social interaction and less civic engagement, and, as a result, crime and violence in the community may persist or increase. In response, funding, staff, and partners to support active living initiatives to advocate for Complete Streets policies are required to improve these conditions.

Figure 3: Active Transportation Feedback Loop



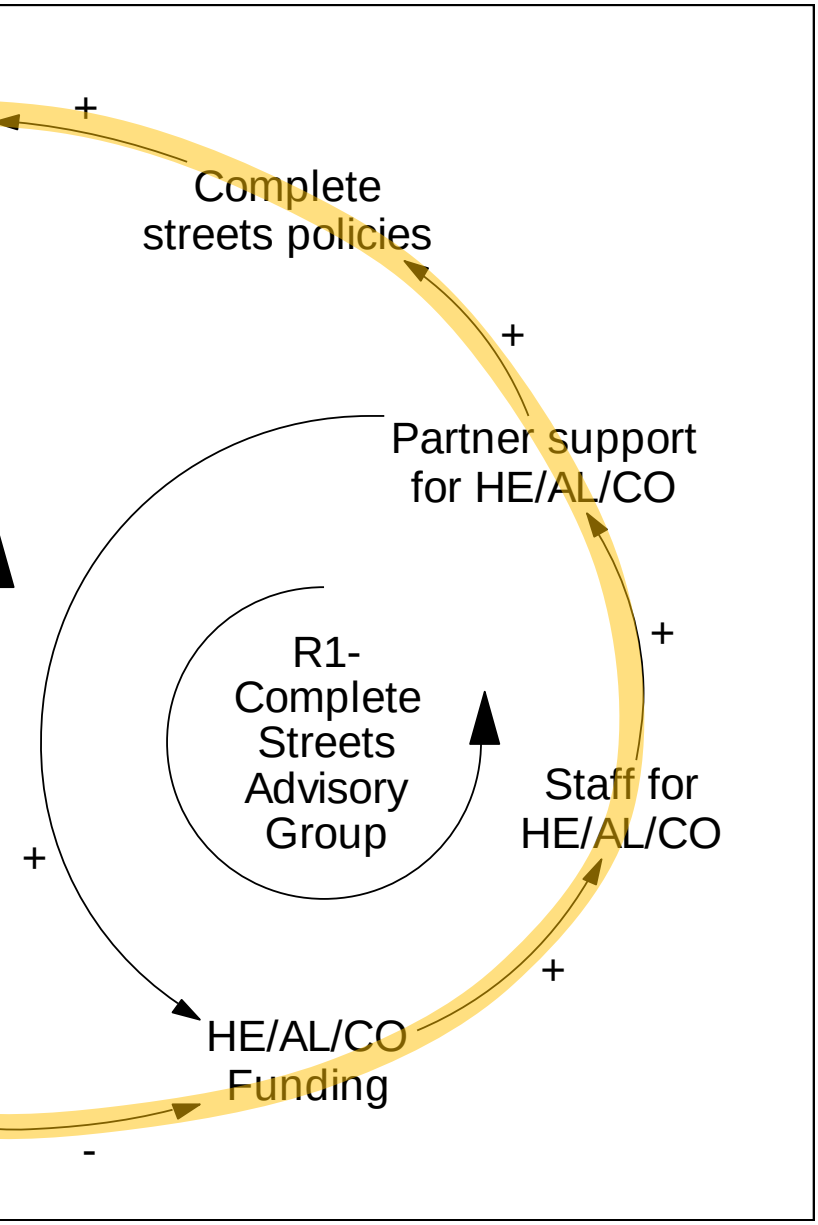
Reinforcing Loop and Notation

These stories represent a reinforcing loop, and the notation in the feedback loop identifies it as a reinforcing loop (see "R2 — Active Transportation" and orange highlighted loop in Figure 3). The words represent variables of quantities that increase and decrease as illustrated in the stories above. These variables change over time and are influenced by other variables as indicated by the arrows. Each arrow represents a causal relationship, and the plus and minus signs on the arrows indicate whether or not the

"With the hospitality zone, they're actually talking about [installing] bike racks and lanes... And the whole complete streets thing this year might help a lot [in terms of] integrating it into normal projects instead of being just an add on. I'm optimistic too; I know that's a one-time funding source, but there's going to be a lot of one-time funding sources. But, the fact that they are thinking about how they are going to do complete streets thematically, despite this being a one-time funding source." (Participant)

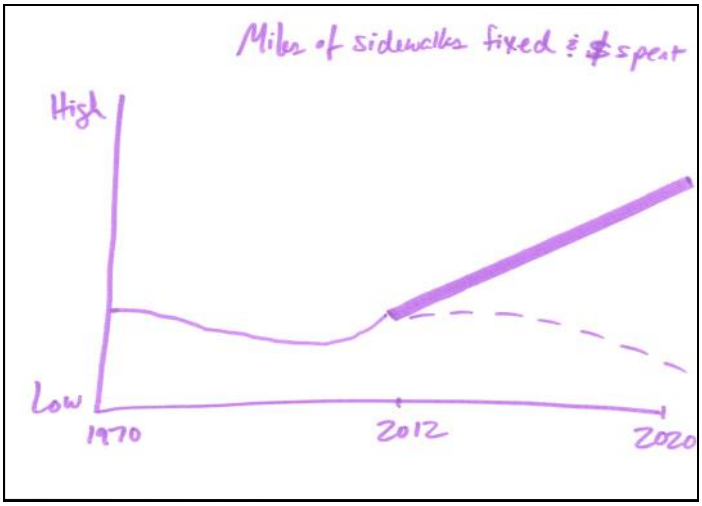
influence of one variable on another variable (1) increases/adds to (plus or "+" sign), or (2) decreases/ removes from the other variable (minus or "-" sign). These signs are referred to as polarities.

In a reinforcing loop, the effect of an increase or decrease in a variable continues through the cycle and returns an increase or decrease to the same variable, respectively.



advocacy efforts related to complete streets may stimulate or reinforce support for this movement.

In addition to these insights, systems thinking can also help to pose key questions for assessment and evaluation, including evaluation of relationships between active transportation and civic engagement, civic engagement and crime and violence, and crime and violence and funding for healthy eating and active living initiatives.



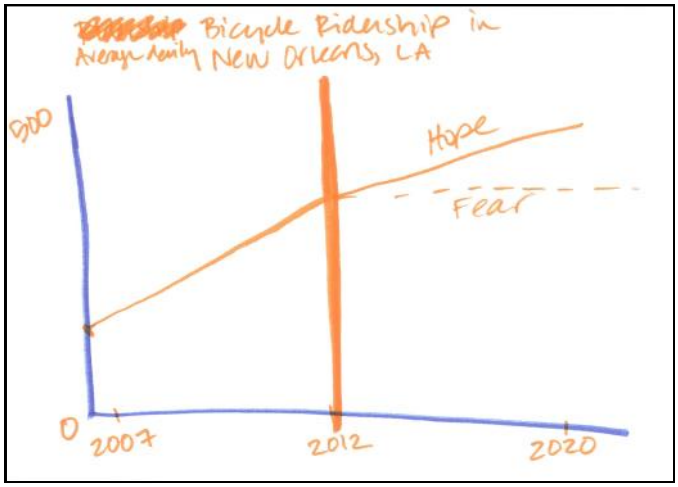
Looking specifically at the "+" or "-" notation, a feedback loop that has zero or an even number of "-" signs, or polarities, is considered a reinforcing loop. Balancing loops, with an odd number of "-" signs in the loop, are another type of feedback loop.

In isolation, this reinforcing loop represents the influence of Complete Streets policies on active transportation (and physical activity). To understand other influences on these variables, it is important to remember that this reinforcing loop is only one part of the larger CLD (see Figures 1 and 2), and the other loops and causal relationships can have an impact on the variables in this loop.

System Insights for *KidsWalk Coalition*

Participants identified that the miles of sidewalks repaired as well as funds spend on these repairs has slightly declined and remained low since the 1970s in New Orleans, Louisiana (see above behavior over time graph). On the brighter side, bicycle ridership in the area has increased steadily since 2006-7.

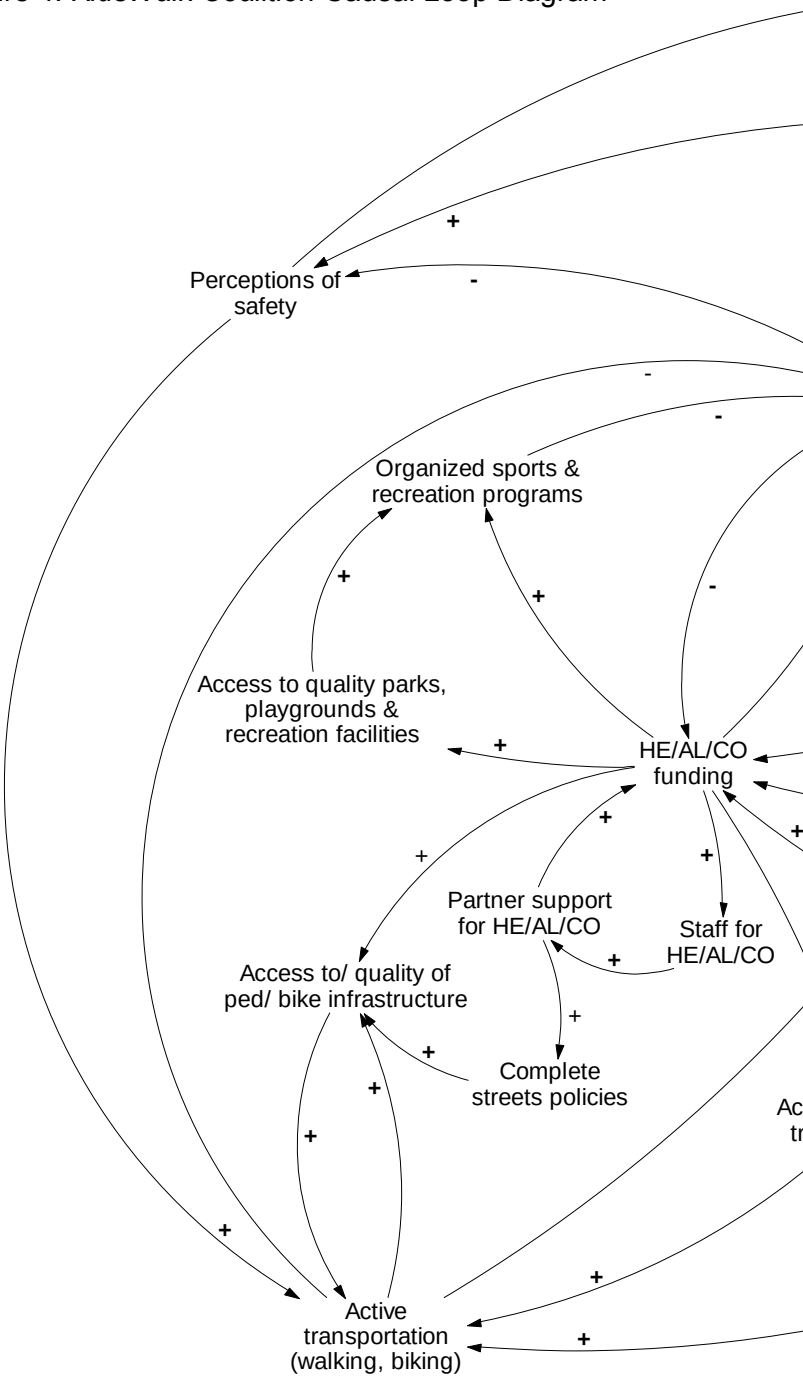
From the systems thinking exercises, several insights can inform the partners' active transportation strategy. For instance, recruiting the growing population of bicyclists in civic engagement and



Opportunities for Systems Thinking in New Orleans, Louisiana

This storybook provided an introduction to some basic concepts and methods for systems thinking at the community level, including: causal loop diagrams, variables, causal relationships and polarities, reinforcing feedback loops, and balancing feedback loops, among others. For the *KidsWalk Coalition* partners, this storybook also summarized the healthy eating, active living, partnership and community capacity, social determinants, and health and health behaviors subsystems in the New Orleans causal loop diagram as well as an example feedback loop corresponding to the partnership's primary strategies.

Figure 4: *KidsWalk Coalition* Causal Loop Diagram



This causal loop diagram reflects a series of conversations among partners and residents from 2011 to 2013. Some discussions probed more deeply into different variables through the behavior over time graphs exercise, or causal relationships through the causal loop diagram exercise.

This represented a first attempt to collectively examine the range of things that affect or are affected by policy, system, and environmental changes in New Orleans, Louisiana to promote healthy eating and active living as well as preventing childhood overweight and obesity.

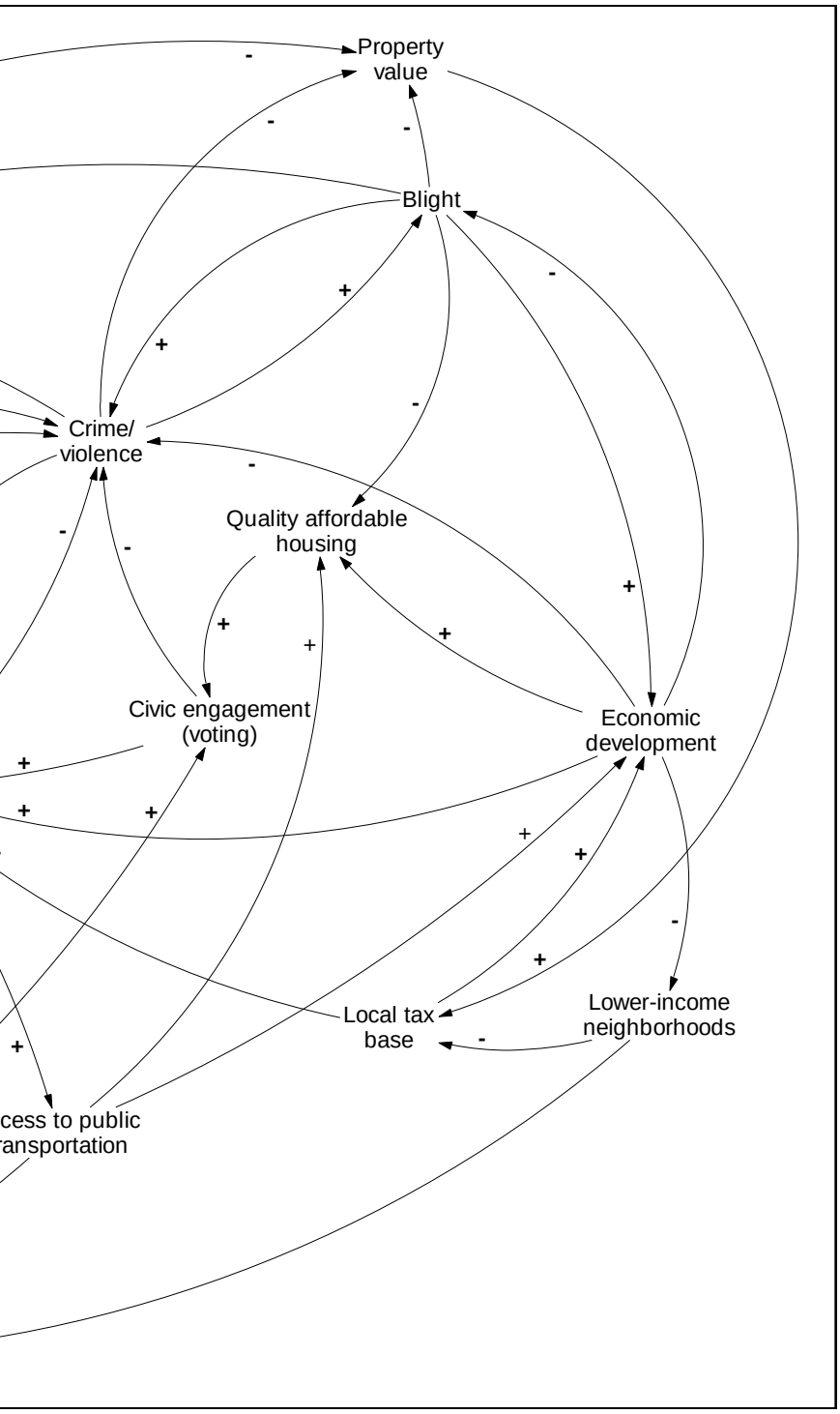
Yet, there are several limitations to this storybook, including:

- the participants represent a sample of the *KidsWalk Coalition* partners (organizations and residents) as opposed to a representative snapshot of government agencies, community organizations, businesses, and community residents;
- the behavior over time graphs and the causal loop diagram represent perceptions of the participants in these exercises (similar to a survey or an interview representing perceptions of the respondents);
- the exercises and associated dialogue took place in brief one- to two-hour sessions, compromising the group's capacity to spend too much time on any one variable, relationship, or feedback loop; and
- the responses represent a moment in time so the underlying structure of the diagram and the types of feedback represented may reflect "hot button" issues of the time.

Much work is yet to be done to ensure that this causal loop diagram is accurate and comprehensive, for example:

- having conversations to discuss existing feedback loops to ensure that the appropriate variables and relationships are represented accurately;

- reviewing the behavior over time graphs (see also Appendix E) to confirm that the trends reflect common perceptions among residents and compare these trends to actual data;
- revisiting variables removed because they were not part of feedback loops, including stigma against public transportation, suburban sprawl, government subsidies for produce (not commodities), fast food restaurants, food advertising & marketing (unhealthy foods/ beverages), screen time, racial SES segregation, active neighborhood design, urban density, pollution, automobile use, locally grown produce, demand for nutrient-poor foods/beverages; and
- starting new conversations about other variables (behavior over time graphs exercise) or relationships (causal loop diagram exercise) to add to this diagram.



In addition, different subgroups in New Orleans may use this causal loop diagram to delve in deeper into some of the subsectors (e.g., healthy eating, active living) or feedback loops, creating new, more focused causal loop diagrams with more specific variables and causal relationships.

Use of more advanced systems science methods and analytic approaches to create computer simulation models is another way to take this early work to the next level. The references section includes citations for resources on these methods and analytic approaches, and it is necessary to engage professional systems scientists in these activities.

Please refer to the Appendices for more information, including:

- Appendix A: Behavior over time graphs generated during site visit
- Appendix B: Photograph of the original version of the *KidsWalk Coalition* Causal Loop Diagram
- Appendix C: Original translation of the causal loop diagram into Vensim PLE
- Appendix D: Transcript translation of the causal loop diagram into Vensim PLE
- Appendix E: Behavior over time graphs not represented in the storybook

References for Systems Thinking in Communities:

Group model building handbook:
Hovmand, P., Brennan L., & Kemner, A. (2013). Healthy Kids, Healthy Communities Group Model Building Facilitation Handbook. Retrieved from http://www.transtria.com/hkhc.

Vensim PLE software for causal loop diagram creation and modification:
Ventana Systems. (2010). Vensim Personal Learning Edition (Version 5.11A) [Software]. Available from http://vensim.com/vensim-personal-learning-edition/

System dynamics modeling resources and support:
Andersen, D. F. and G. P. Richardson (1997). "Scripts for group model building." System Dynamics Review 13(2): 107-129.

Hovmand, P. (2013). Community Based System Dynamics. New York, NY: Springer.

Hovmand, P. S., et al. (2012). "Group model building "scripts" as a collaborative tool." Systems Research and Behavioral Science 29: 179-193.

Institute of Medicine (2012). An integrated framework for assessing the value of community-based prevention. Washington, DC, The National Academies Press.

Meadows, D. (1999). Leverage points: places to intervene in a system. Retrieved from http://www.donellameadows.org/archives/leverage-points-places-to-intervene-in-a-system/

Richardson, G. P. (2011). "Reflections on the foundations of system dynamics." System Dynamics Review 27 (3): 219-243.

Rouwette, E., et al. (2006). "Group model building effectiveness: A review of assessment studies." System Dynamics Review 18(1): 5-45.

Sterman, J. D. (2000). Business dynamics: Systems thinking and modeling for a complex world. New York, NY: Irwin McGraw-Hill.

System Dynamics in Education Project. (1994). Road maps: A guide to learning system dynamics. Retrieved from http://www.clexchange.org/curriculum/roadmaps/

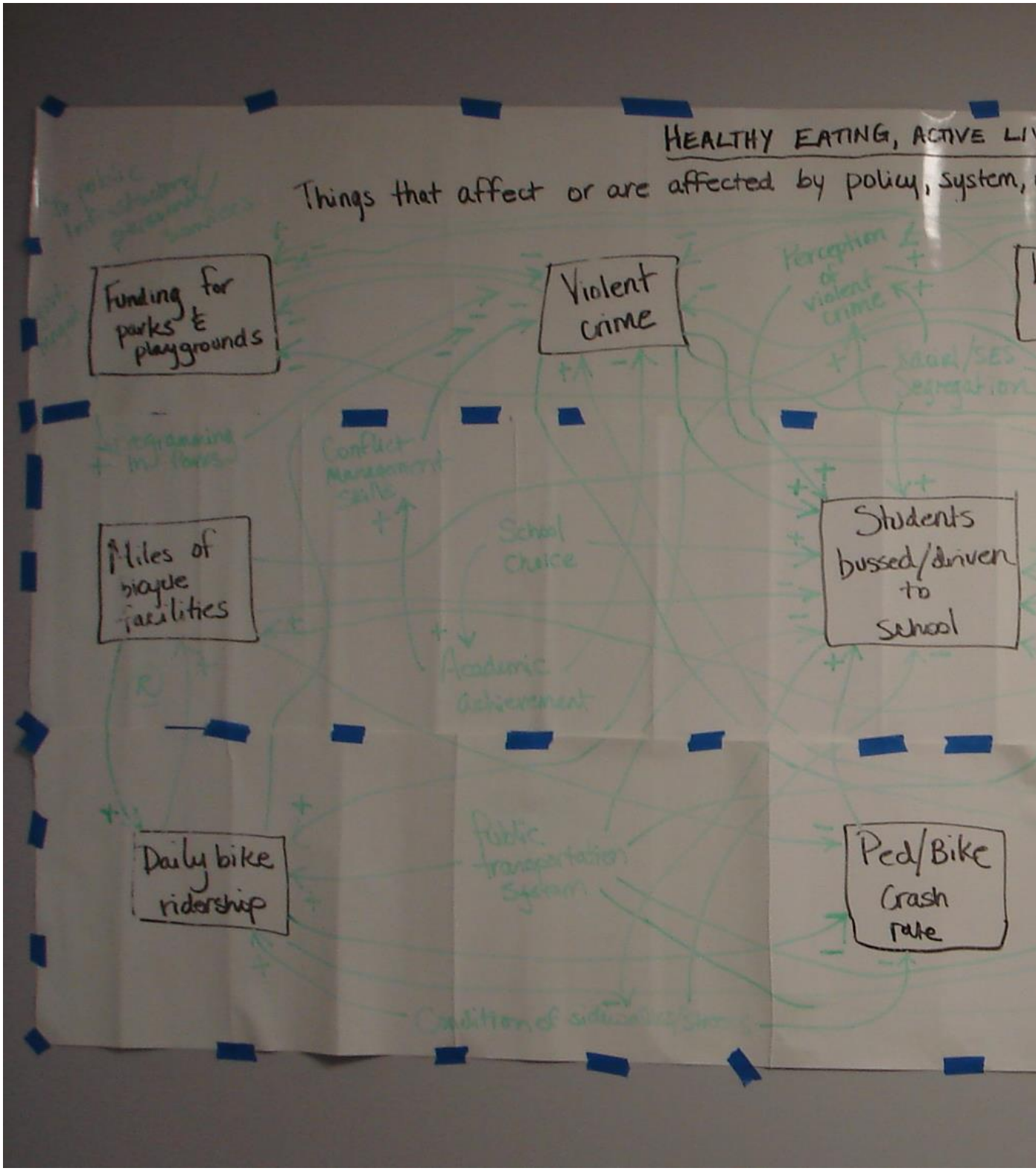
Vennix, J. (1996). Group model building. New York, John Wiley & Sons.

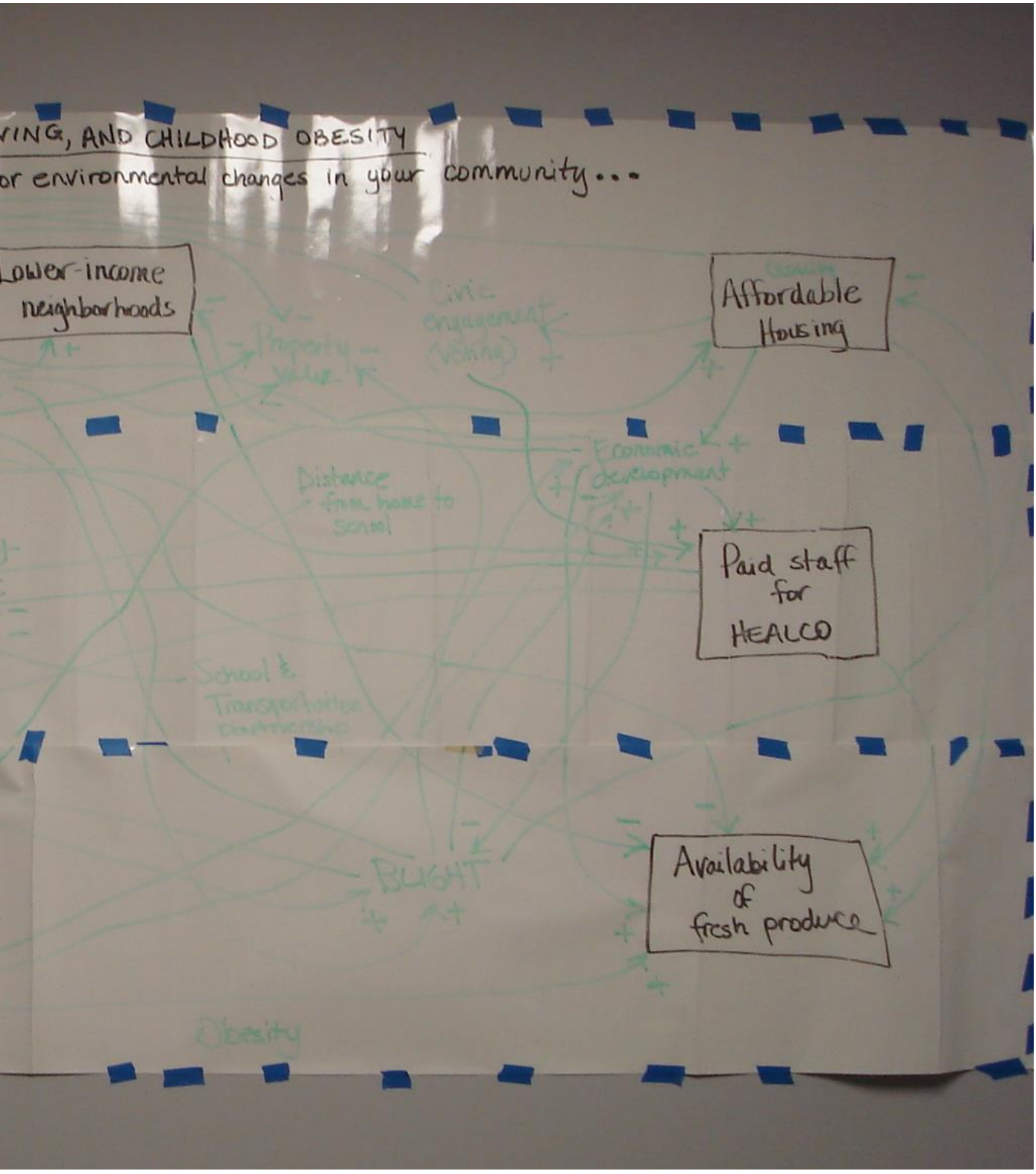
Zagonel, A. and J. Rohrbaugh (2008). Using group model building to inform public policy making and implementation. Complex Decision Making. H. Qudart-Ullah, J. M. Spector and P. I. Davidsen, Springer-Verlag: 113-138.

Appendix A: Behavior Over Time Graphs Generated during Site Visit

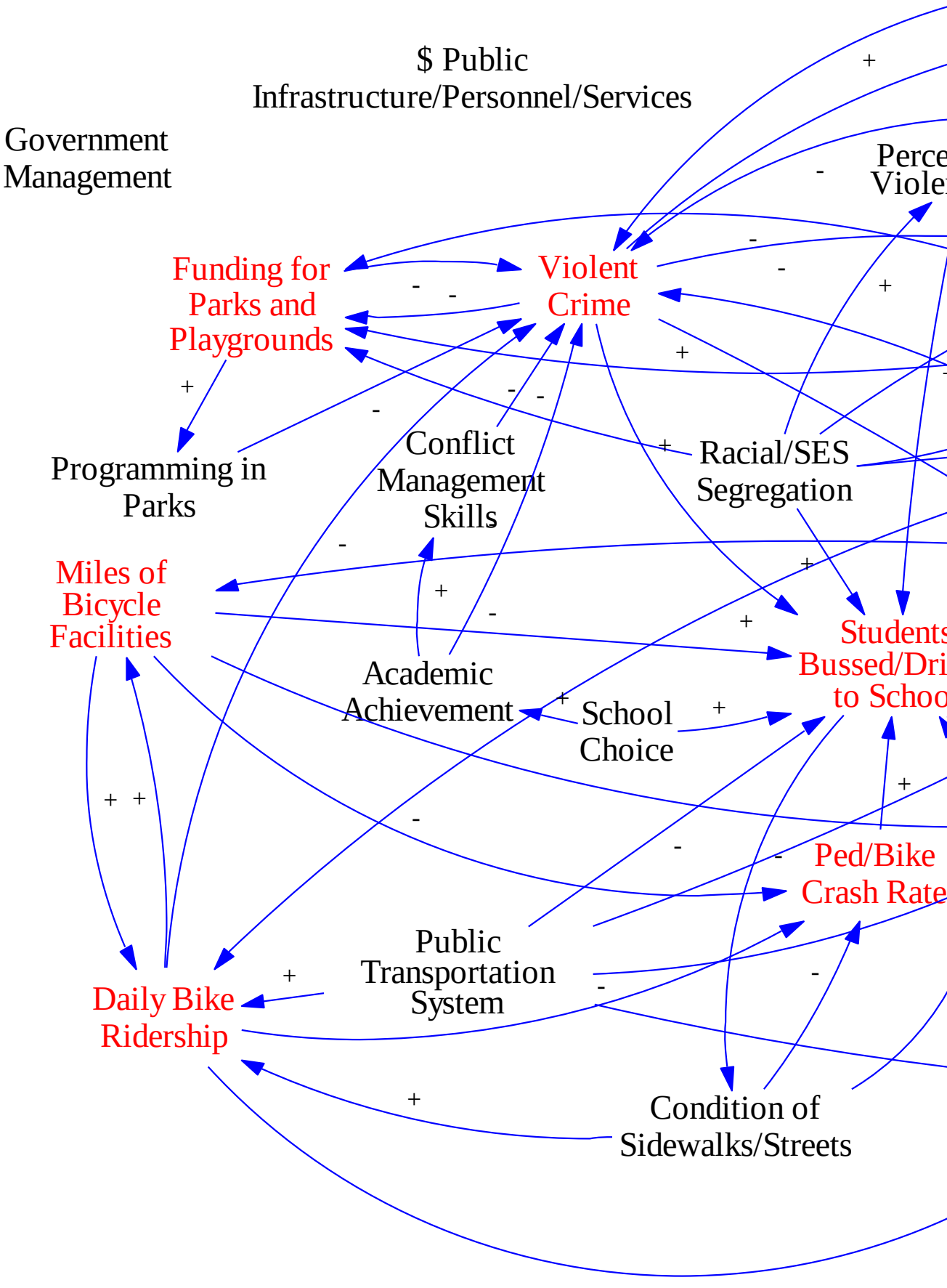
New Orleans, Louisiana: *KidsWalk Coalition*	
Categories	**Number of Graphs**
Active Living Behavior	11
Active Living Environments	10
Funding	1
Healthy Eating Behavior	0
Healthy Eating Environments	3
Marketing and Media Coverage	1
Obesity and Long Term Outcomes	0
Partnership & Community Capacity	3
Policies	3
Programs & Promotions (Education and Awareness)	1
Social Determinants of Health	5
Total Graphs	**39**

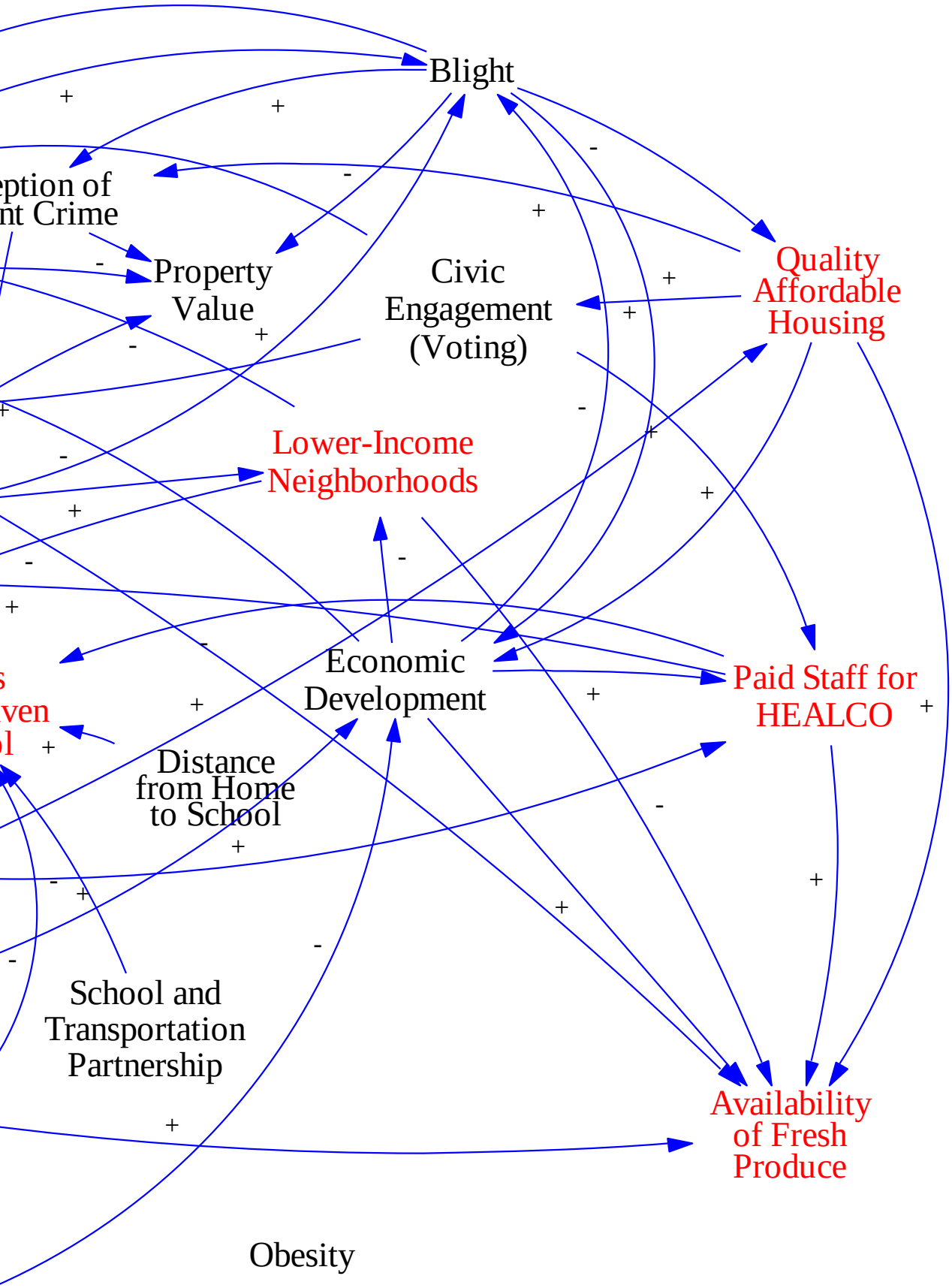
Appendix B: Photograph of the Original Version of the *KidsWalk Coalition* Causal Loop Diagram



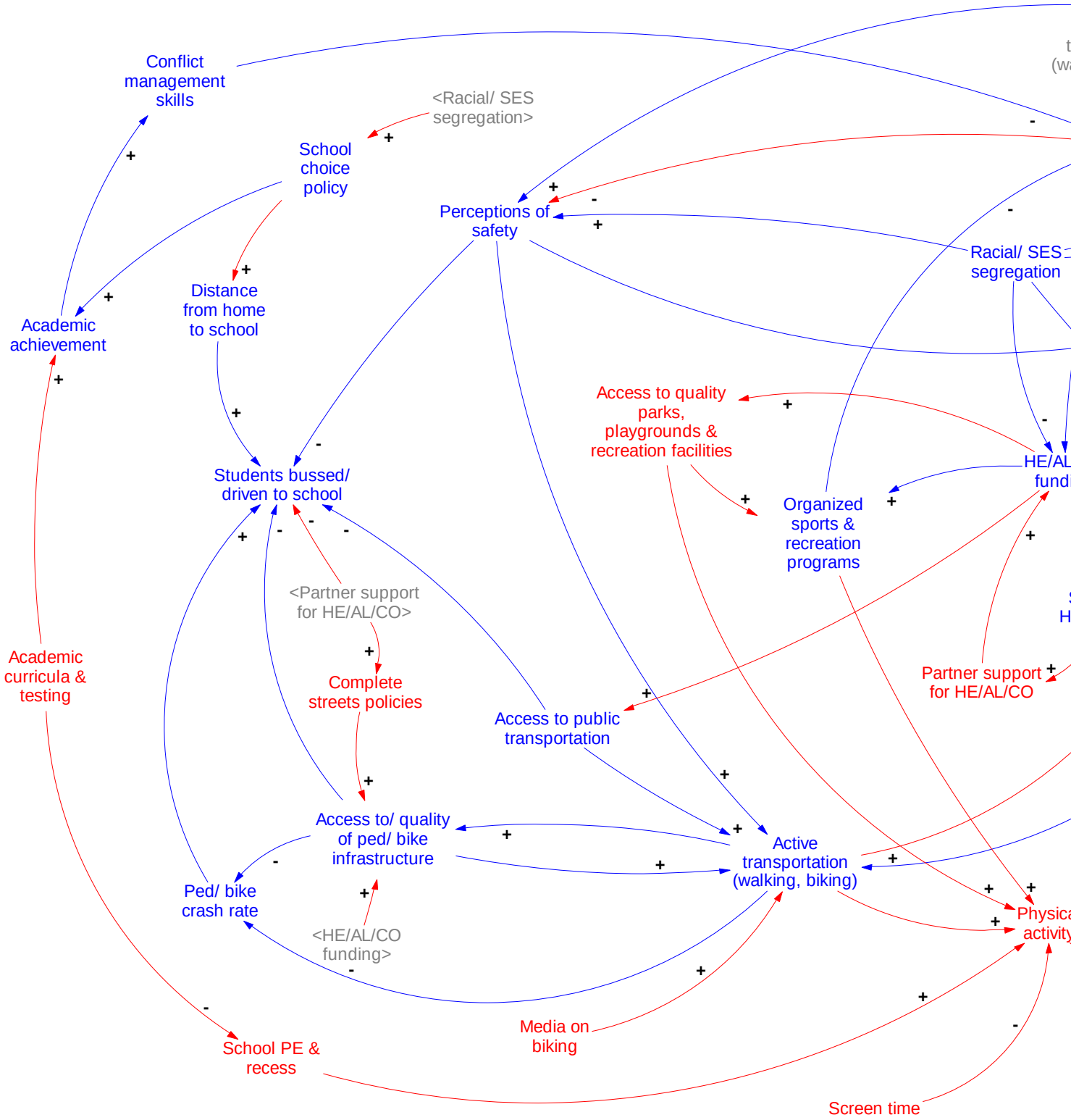

VING, AND CHILDHOOD OBESITY
or environmental changes in your community...
Lower-income neighborhoods
Affordable Housing
Civic engagement (voting)
Property value
Distance from home to school
Economic development
Paid staff for HEALCO
School & Transportation partnerships
BUGHT
Availability of fresh produce
Obesity

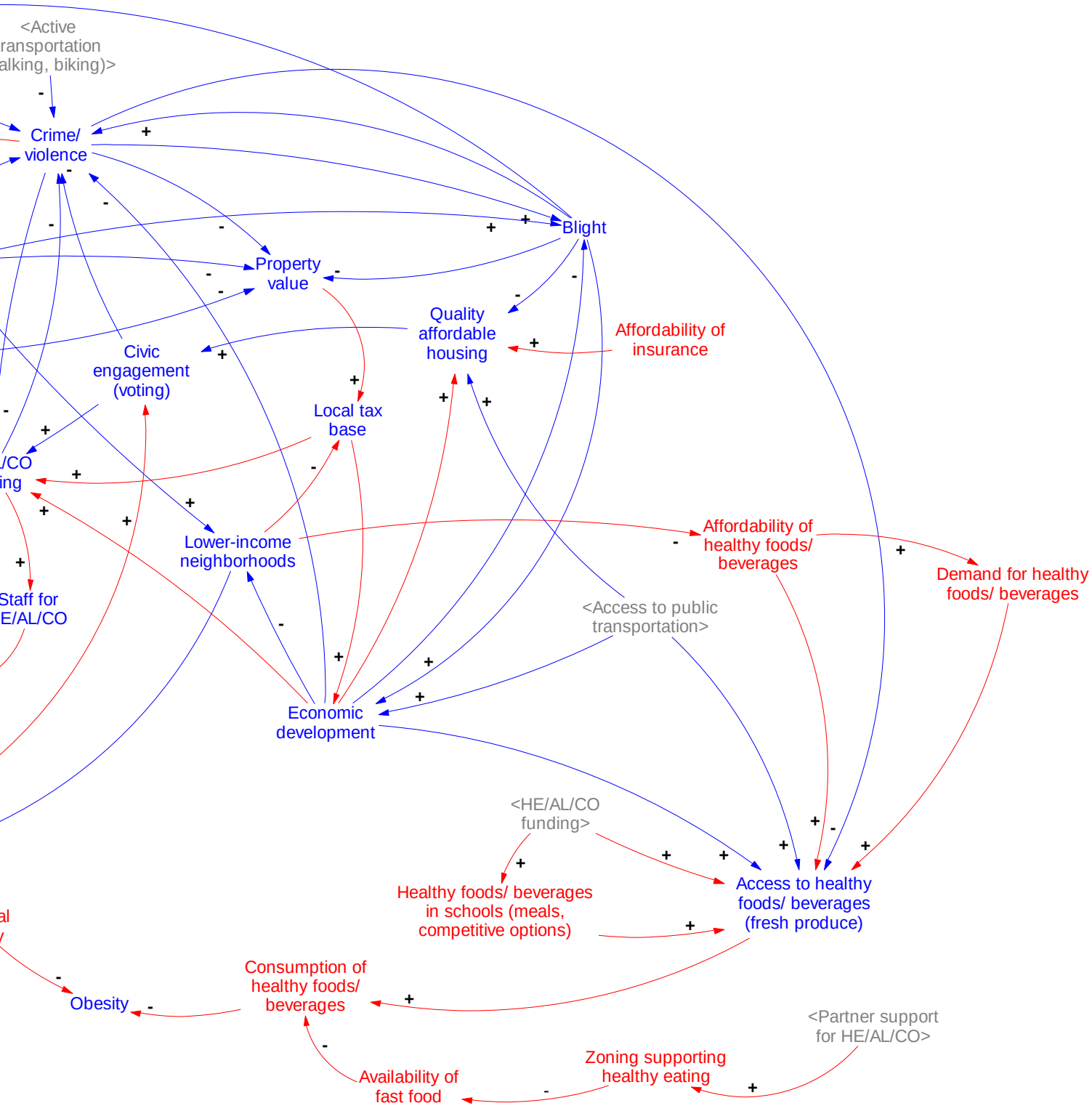
Appendix C: Original Translation of the Causal Loop Diagram into Vensim PLE



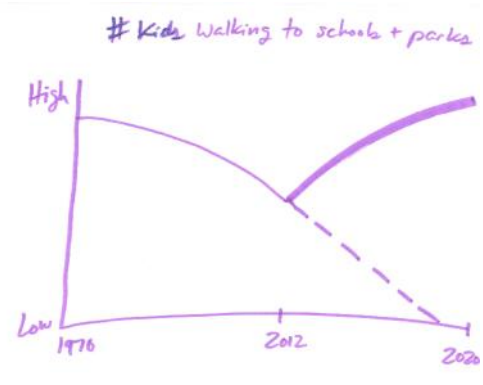

Blight
eption of
nt Crime
Property
Value
Civic
Engagement
(Voting)
Quality
Affordable
Housing
Lower-Income
Neighborhoods
Economic
Development
Paid Staff for
HEALCO
ven
l
Distance
from Home
to School
School and
Transportation
Partnership
Availability
of Fresh
Produce
Obesity

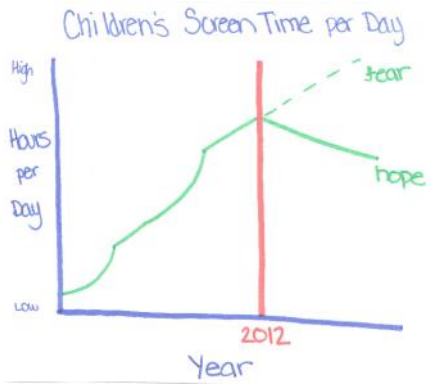
Appendix D: Transcript Translation of the Causal Loop Diagram into Vensim PLE

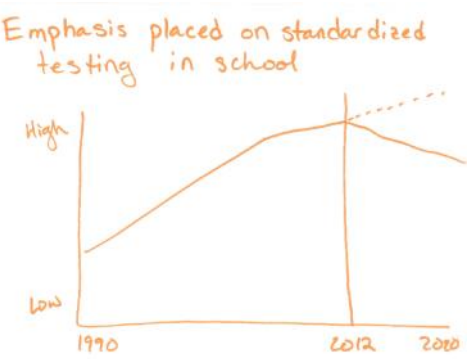


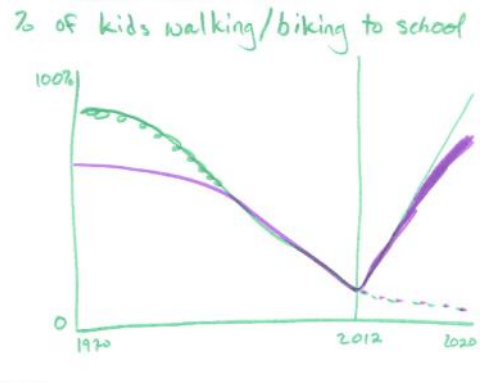

<Active
ransportation
alking, biking)>
Crime/
violence
Blight
Property
value
Quality
affordable
housing
Affordability of
insurance
Civic
engagement
(voting)
Local tax
base
/CO
ing
Lower-income
neighborhoods
Affordability of
healthy foods/
beverages
Demand for healthy
foods/ beverages
Staff for
E/AL/CO
<Access to public
transportation>
Economic
development
<HE/AL/CO
funding>
Healthy foods/ beverages
in schools (meals,
competitive options)
Access to healthy
foods/ beverages
(fresh produce)
al
Consumption of
healthy foods/
beverages
Obesity
<Partner support
for HE/AL/CO>
Zoning supporting
healthy eating
Availability of
fast food

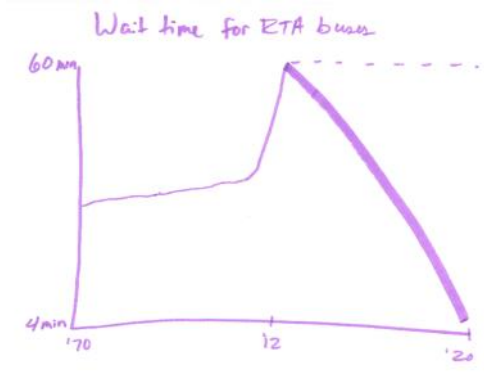
Appendix E: Behavior Over Time Graphs not Represented in the Storybook

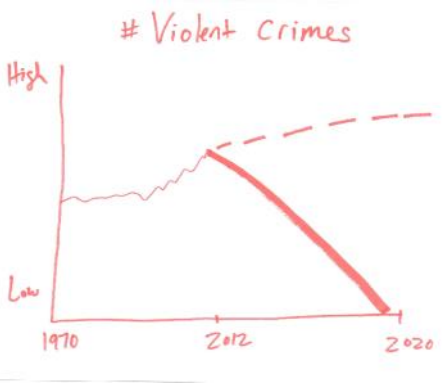


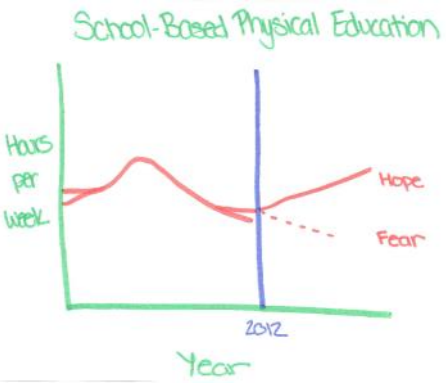


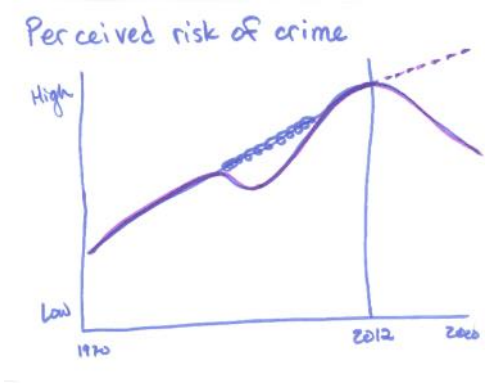


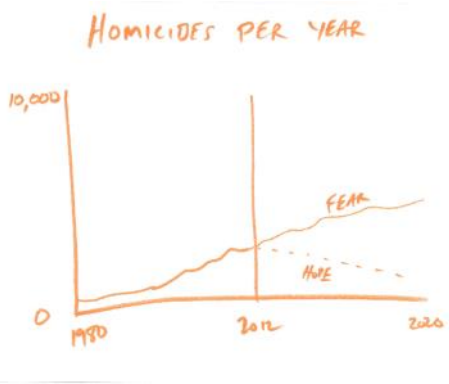


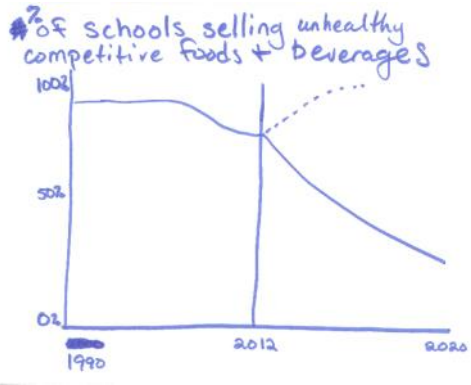


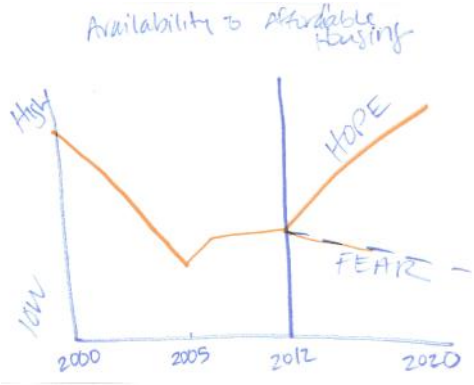


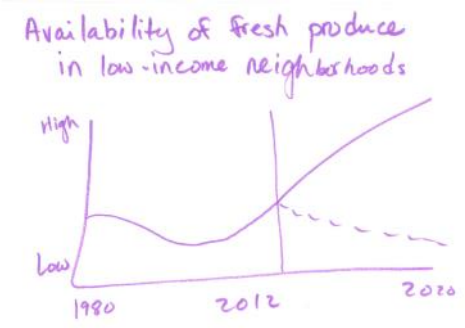


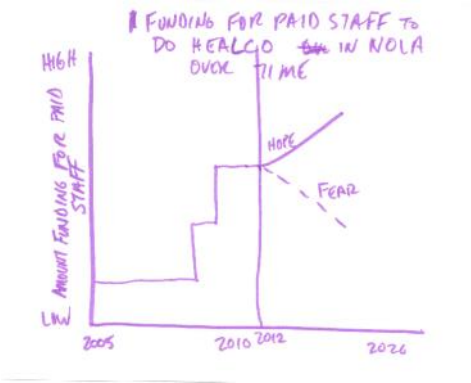


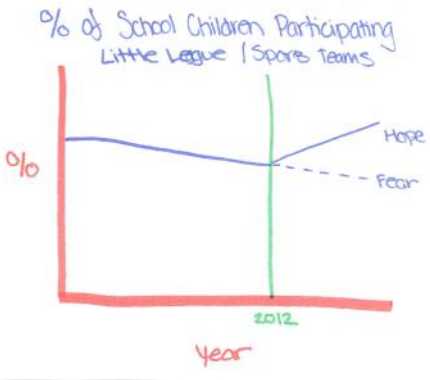


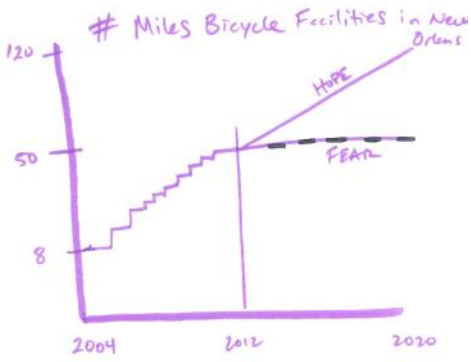


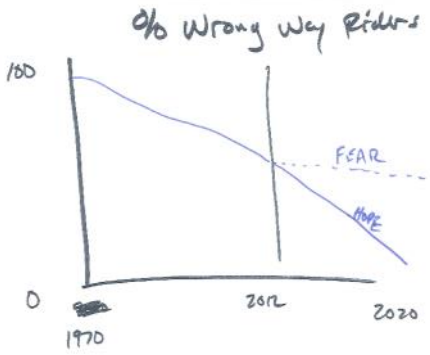


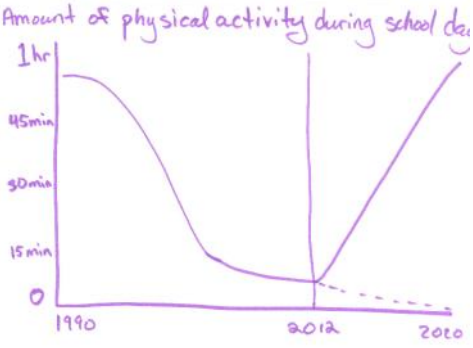

Availability of fresh produce in low-income neighborhoods
High
Low
1980
2012
2020

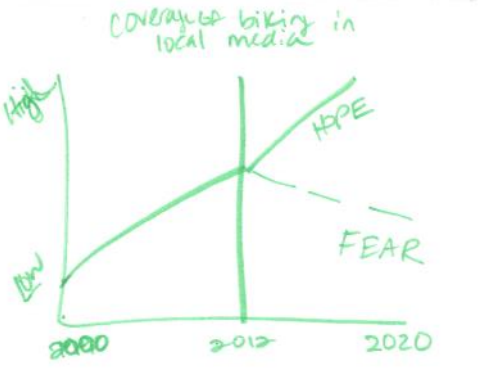

FUNDING FOR PAID STAFF TO DO HEALCO IN NOLA OVER TIME
HIGH
AMOUNT FUNDING FOR PAID STAFF
LOW
HOPE
FEAR
2005
2010 2012
2026

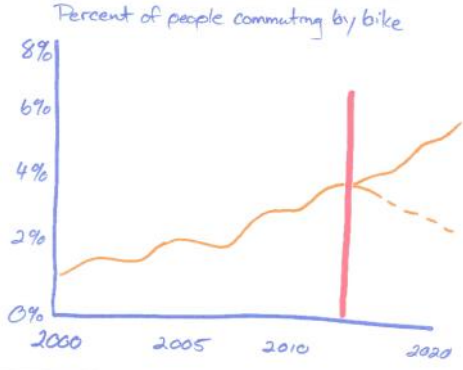

% of School Children Participating Little League / Sports Teams
%
Hope
Fear
2012
Year

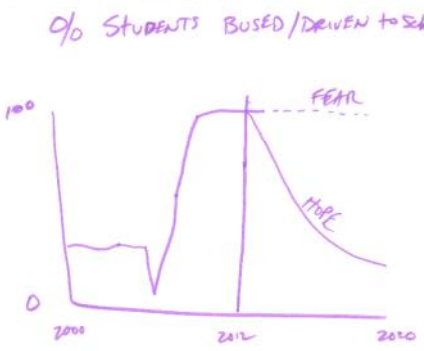

Miles Bicycle Facilities in New Orleans
120
50
8
HOPE
FEAR
2004
2012
2020

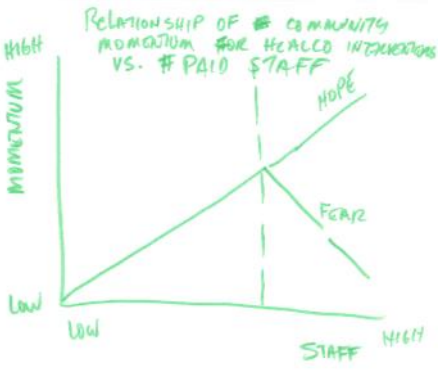

% Wrong Way Riders
100
0
FEAR
HOPE
2012
1970
2020

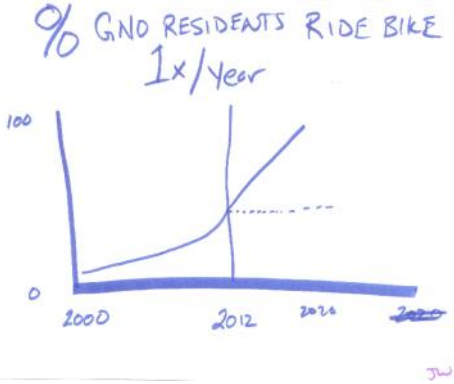

Amount of physical activity during school day
1hr
45min
30min
15min
0
1990
2012
2020

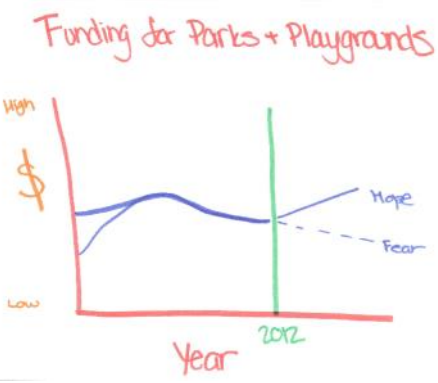

COVERAGE biking in local media
HOPE
FEAR
2000
2012
2020

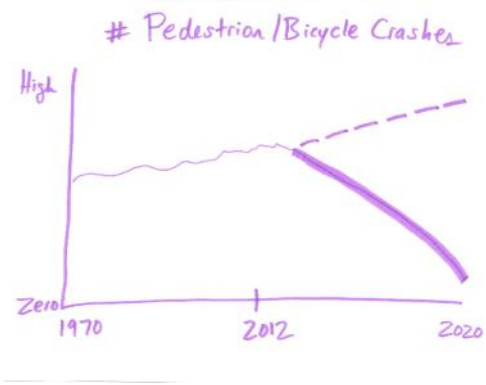

Percent of people commuting by bike
8%
6%
4%
2%
0%
2000
2005
2010
2020

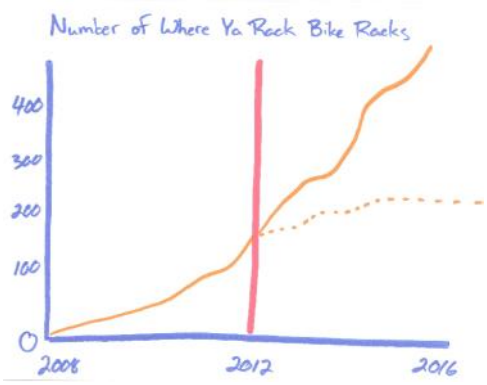

% STUDENTS BUSED/DRIVEN to School
100
0
FEAR
HOPE
2000
2012
2020

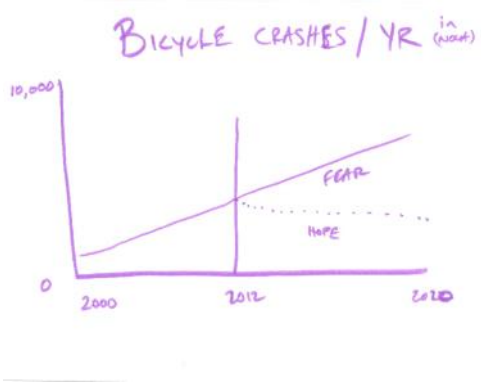

RELATIONSHIP OF # COMMUNITY MOMENTUM FOR HEALCO INTERVENTIONS VS. # PAID STAFF
HIGH
MOMENTUM
LOW
HOPE
FEAR
LOW
STAFF
HIGH


% GNO RESIDENTS RIDE BIKE 1x/Year
100
0
2000
2012
2020

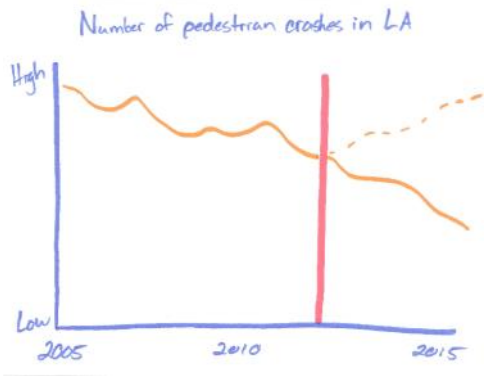

Funding for Parks + Playgrounds
High
$
Low
Hope
Fear
2012
Year

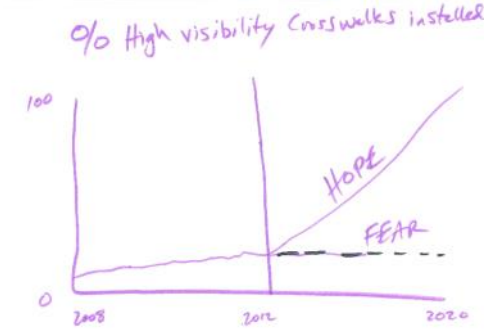

Pedestrian/Bicycle Crashes
High
Zero
1970
2012
2020


Number of Where Ya Rack Bike Racks
400
300
200
100
0
2008
2012
2016

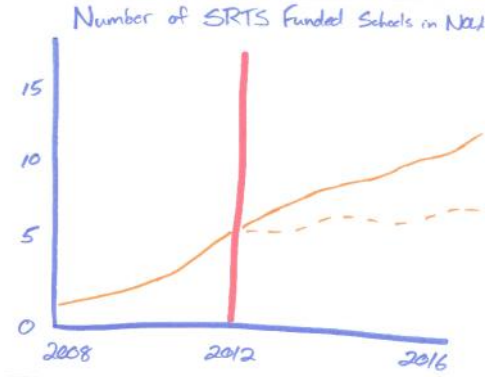

BICYCLE CRASHES / YR in (NOW)
10,000
0
FEAR
HOPE
2000
2012
2020

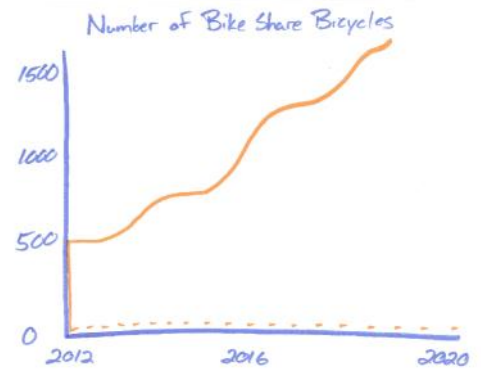

Availability of Fast Food
High
Low
Fear
Hope
1980
2012
2020

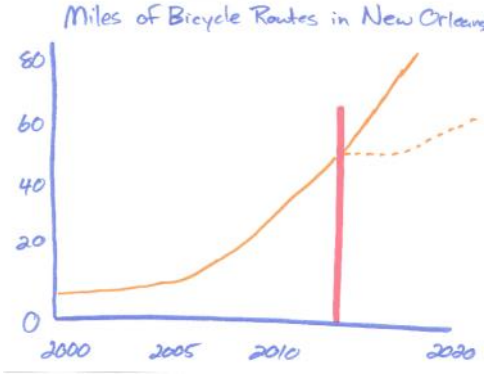

Number of pedestrian crashes in LA
High
Low
2005
2010
2015


% High visibility Crosswalks installed
100
0
HOPE
FEAR
2008
2012
2020


BIKE EASY FUNDING/YR
300k
0
HOPE
FEAR
2012
2020


Number of SRTS Funded Schools in NOLA
15
10
5
0
2008
2012
2016


Number of Bike Share Bicycles
1500
1000
500
0
2012
2016
2020


Miles of Bicycle Routes in New Orleans
80
60
40
20
0
2000
2005
2010
2020