# Systems Thinking in Communities:

# Understanding the Causes of Inactivity, Poor Diet/Nutrition, and Childhood Obesity in Jacksonville, Florida

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**Acknowledgments**

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## Introduction

*Healthy Kids, Healthy Jacksonville* 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 *Healthy Kids, Healthy Jacksonville* project was to introduce systems thinking at the community level by identifying the essential parts of the Jacksonville, Florida 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, businesses) 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.

## Jacksonville, Florida: Background and Local Participation

The Healthy Jacksonville Childhood Obesity Prevention Coalition was established in 2001 as one of the Community Coalitions of Healthy Jacksonville, a Duval County Health Department initiative. Healthy Kids, Healthy Jacksonville (HKHJ) operated under the Healthy Jacksonville Childhood Obesity Coalition and focused its efforts on food access, joint use, and active transportation.

The partnership established a steering committee to prioritize workplan strategies and provide direction to the overall partnership. The partnership met regularly and organized into workgroups for each major goal of the HKHJ workplan (i.e., Food Policy Council Workgroup, Built Environment Workgroup, Joint Use Workgroup, Communications Workgroup).

The quarterly partnership meetings had an average of 50-60 people in attendance (see Appendix C for a list of partners). Partnership membership and involvement was consistent throughout the project by organizations and community residents. There was strong community support and participation in HKHJ. The Food Policy Council and Context Sensitive Streets efforts were led entirely by partners and key stakeholders. The HKHJ staff provided support for meetings and communication.

### *Healthy Kids, Healthy Jacksonville's* Priorities and Strategies

The partnership and capacity building strategies of *Healthy Kids, Healthy Jacksonville* included:

- **Food Policy Council:** HKHJ created a Duval County Food Policy Council to advocate for healthy food policies in Duval County and across the state. The Food Policy Council hosted annual Food Policy Summits to address food access and healthy eating policies.

The healthy eating and active living strategies of *Healthy Kids, Healthy Jacksonville* included:

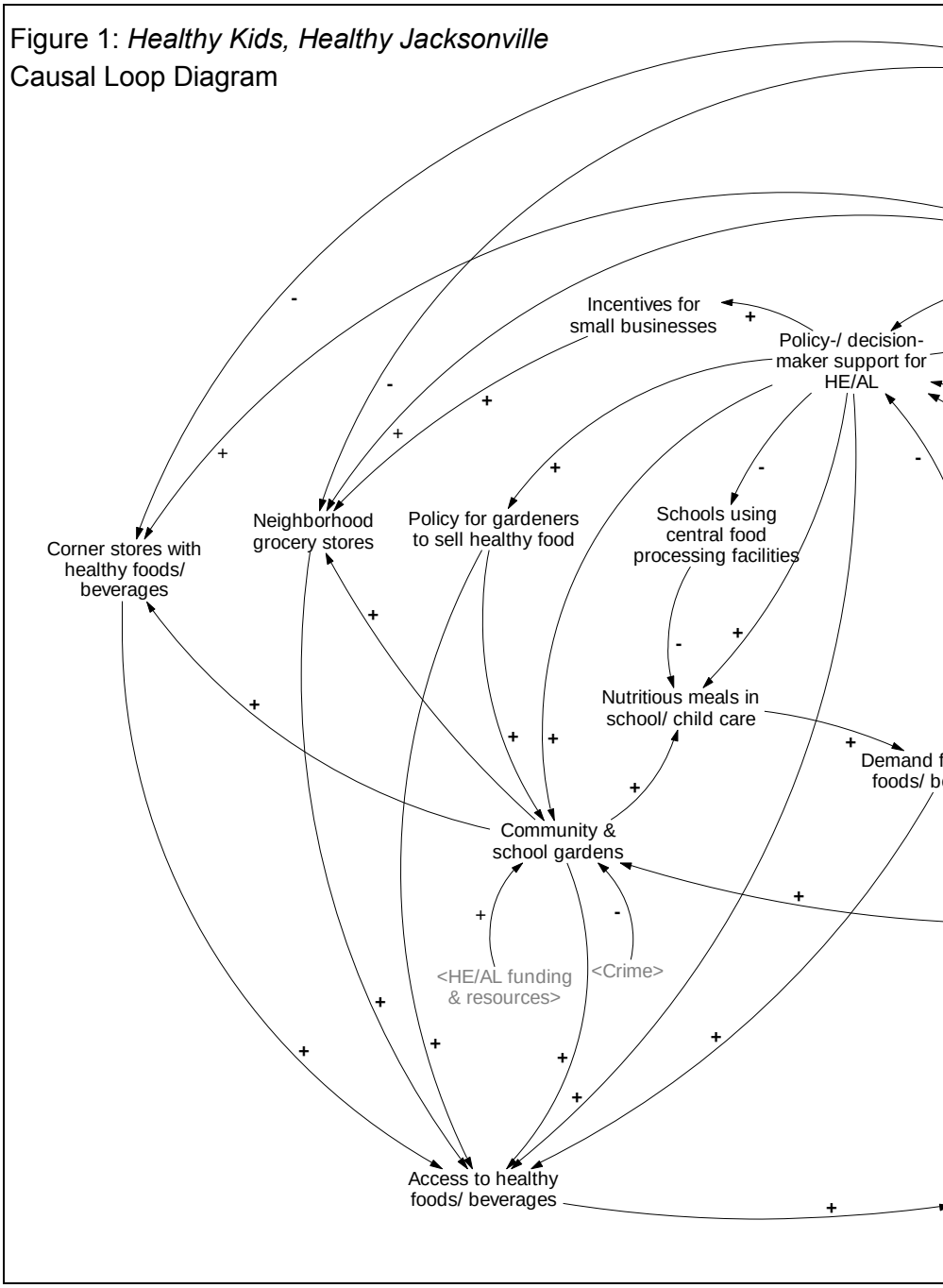
- **Joint Use:** HKHJ partnered with City of Jacksonville Parks and Recreation and the Duval County Public School System to increase school and community resident awareness and utilization of the existing Duval County Public School System joint use policy.
- **Active Transportation:** HKHJ, partners, and community residents provided recommendations and support for the City of Jacksonville's 2030 Mobility Plan and the implementation of Context Sensitive Streets guidelines throughout the city.
- **Access to Healthy Food:** HKHC partnered with Friends of Northeast Florida Gardens and community garden partners to support the implementation and expansion of gardens throughout Duval County. HKHJ partnered with area youth and the Jacksonville Farmers' Market to conduct a "So Fresh, So Clean" media campaign and recruit Health Zone 1 corner stores to sell fresh produce. The partnership worked to increase Supplemental Nutrition Assistance Program and Electronic Benefit Transfer (SNAP/EBT) payments at area farmers' markets. Farmers' market efforts are ongoing.

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

**Systems Thinking in Communities: Jacksonville, Florida**

"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 Jacksonville, Florida 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: *Healthy Kids, Healthy Jacksonville* Causal Loop Diagram



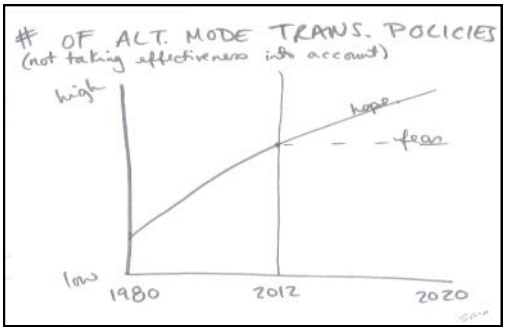

Models, such as Figure 1, provide a way to visualize all the elements of the system and their interactions, with a focus on causal relationships as opposed to associations. Through the model, specific types of causal relationships, or feedback loops, underlying the behavior of the dynamic system, can 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**

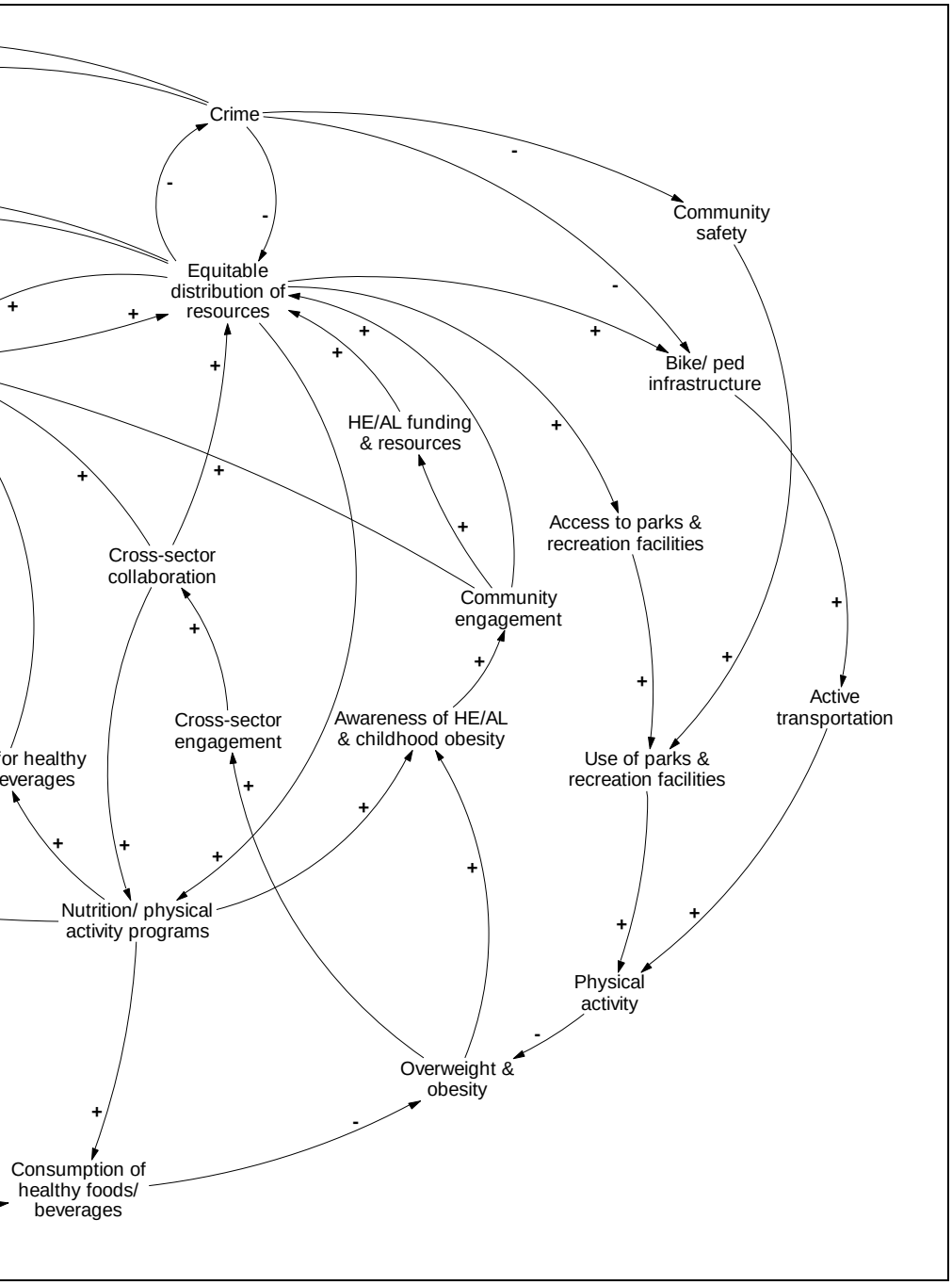
Members of the *Healthy Kids, Healthy Jacksonville* partnership participated in a group model building session in December, 2012 and generated this system. also referred to as a causal loop diagram (Figure 1). Participants in the group model building session included representatives from government agencies, community-based organizations, businesses. 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 Jacksonville 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 policies supporting alternative modes of transportation, the number of these policies has increased since 1980 and the participant hopes that this increase will continue in 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: policy-/ decision-maker support for healthy eating (HE)/ active living (AL) → nutritious meals in school/ child care → demand for healthy foods/ beverages → policy-/ decision-maker support for HE/AL.

What is important to notice is that there are other feedback loops interacting simultaneously to influence or to be influenced by policy-/ decision-maker support for HE/AL. Some variables may increase policy-/ decision-maker support for HE/AL 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 *Healthy Kids, Healthy Jacksonville* 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 Jacksonville, Florida and to stimulate greater conversation related to Jacksonville's 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 Jacksonville, Florida. 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.

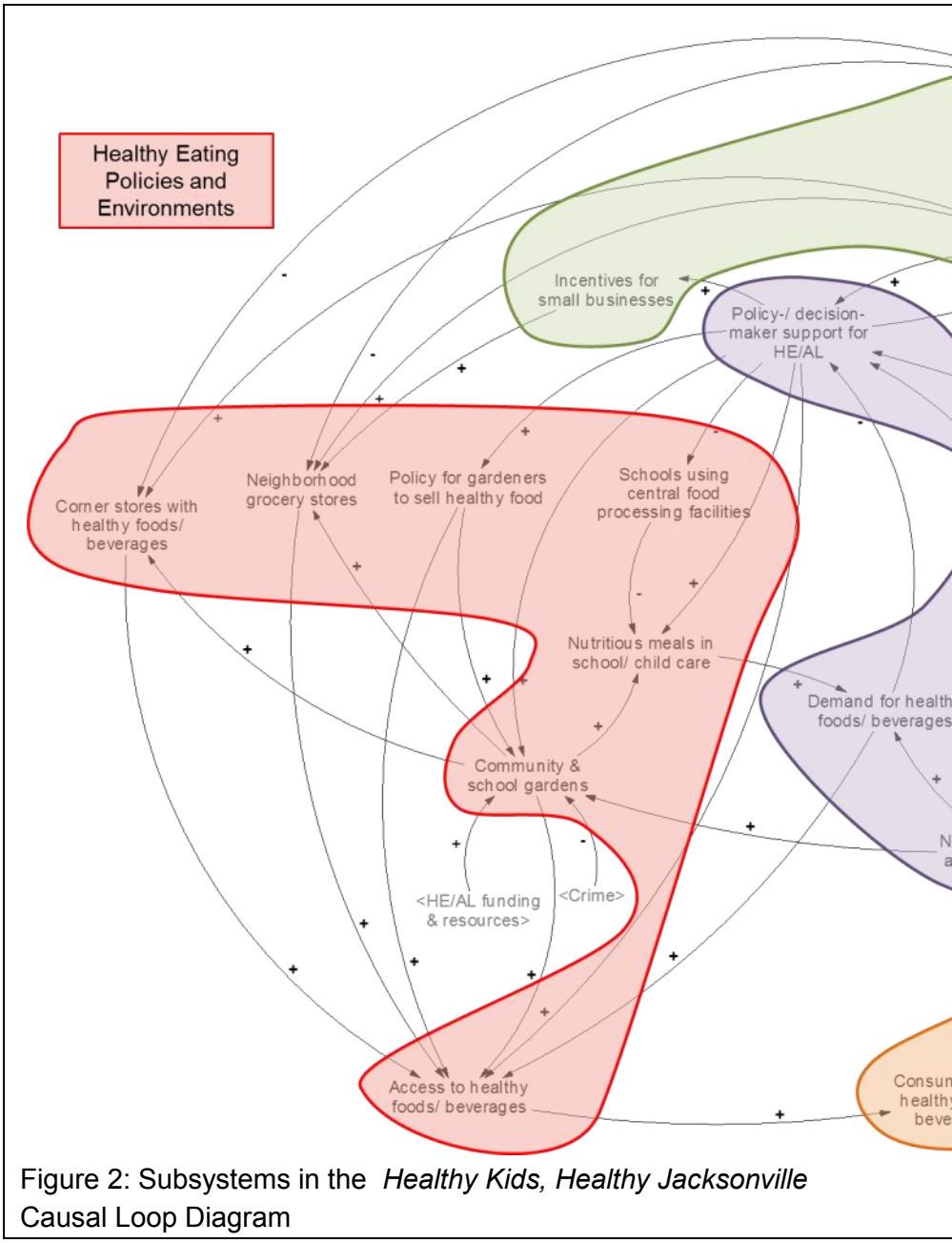



Figure 2: Subsystems in the *Healthy Kids, Healthy Jacksonville* Causal Loop Diagram

Healthy Eating Policies and Environments (Red)

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 ten graphs related to policy or environmental strategies (e.g., community and school gardens) or contexts (e.g., neighborhood grocery stores) that affected or were affected by the work of *Healthy Kids, Healthy Jacksonville*. The variables represent participants' conversations from the behavior over time graph and causal loop diagram exercises.

Active Living Policies and Environments (Blue)

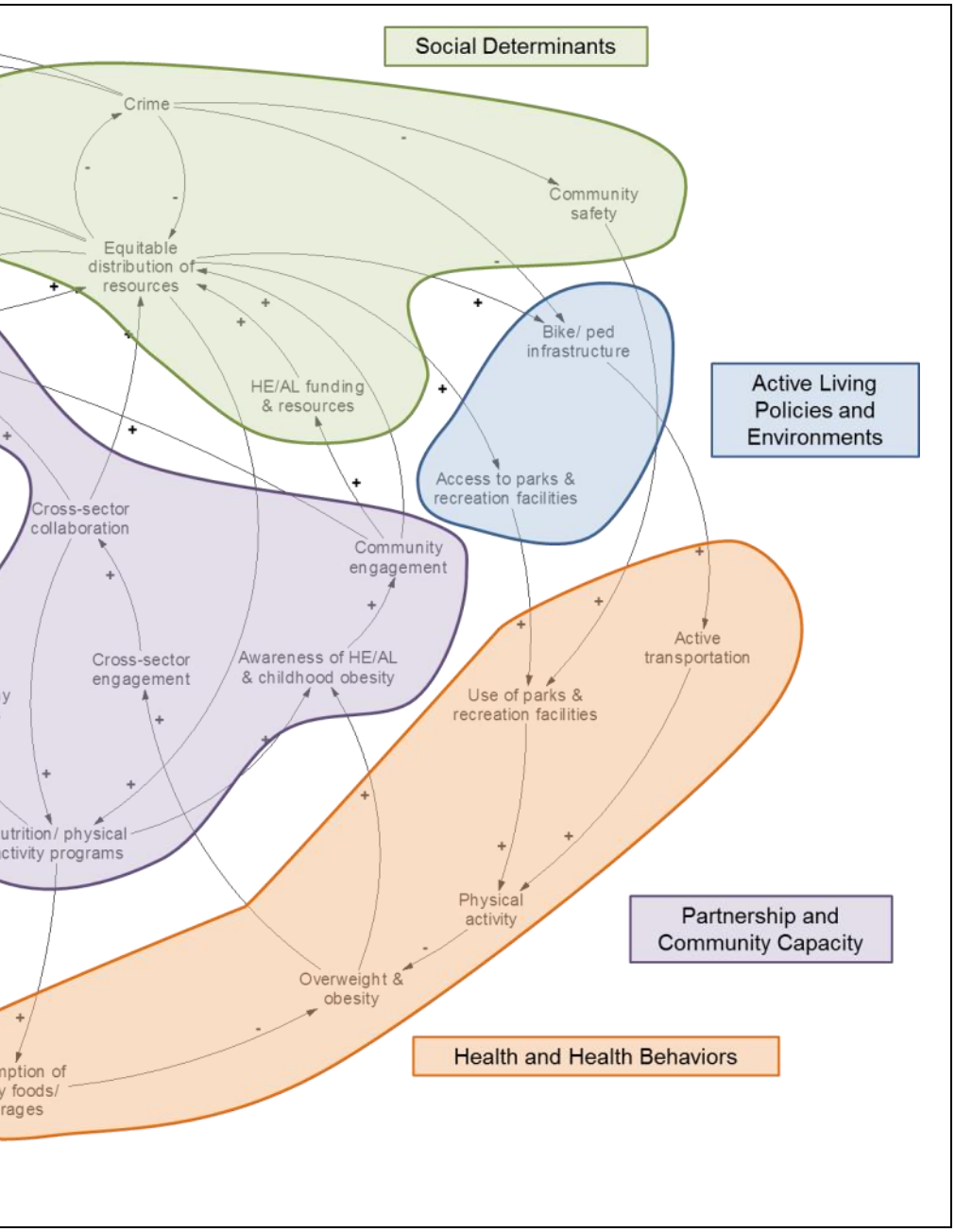
The active living policy and environmental subsystem includes design, planning, construction, and enforcement or maintenance related to access to opportunities for active transportation and recreation. For this topic, the group model building participants developed six graphs related to policy or environmental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

Health and Health Behaviors (Orange)

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., use of parks and recreation facilities, active transporation).

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, *Healthy Kids, Healthy Jacksonville* worked to increase cross-sector collaboration and engagement through a food policy council. This subsystem also includes community factors outside the partnership that may influence or be influenced by their efforts, such as policy– or decision-maker support for healthy eating and active living.




Social Determinants

Finally, the social determinants subsystem denotes societal conditions (e.g., equitable distribution of resources) and psychosocial influences (e.g., perceptions of community 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.

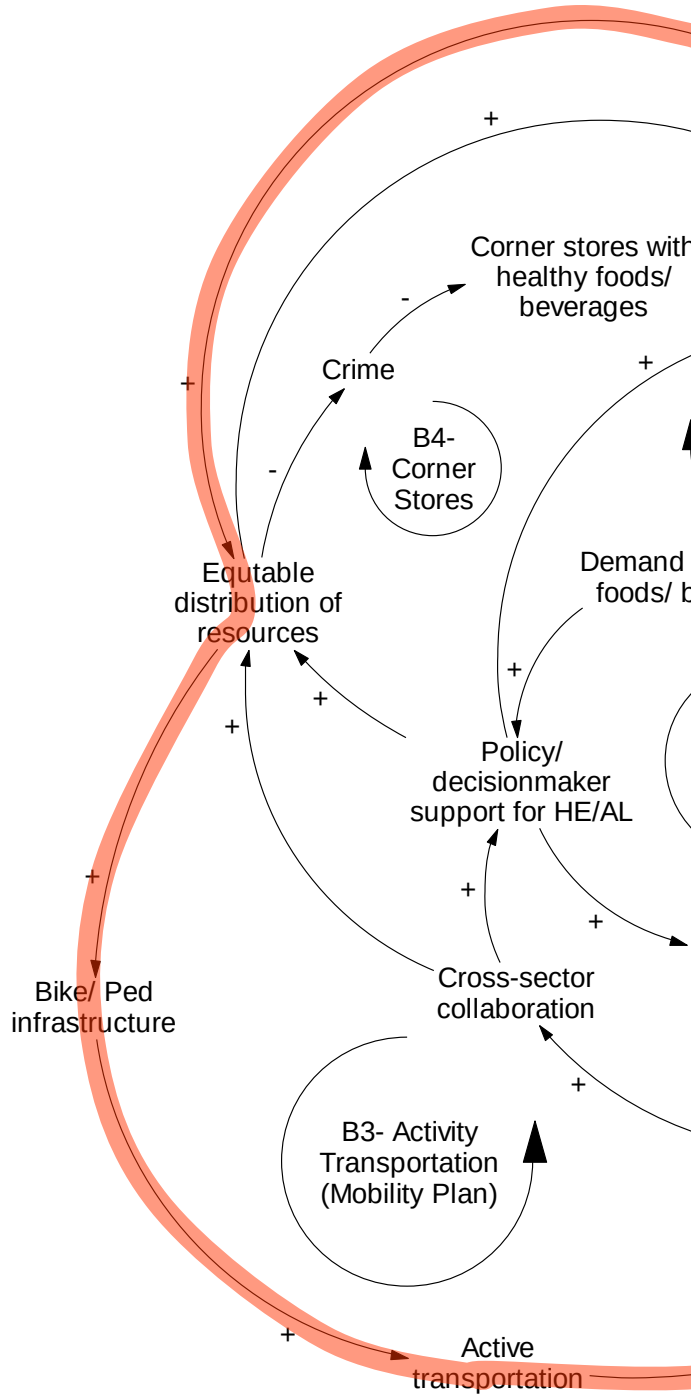
Each one of these subsystems has many more variables, causal relationships (arrows), and feedback loops that can be explored in greater depth by the *Healthy Kids, Healthy Jacksonville* partners or by other representatives in Jacksonville, Florida. Using this CLD as a starting place, community conversations 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 *Healthy Kids, Healthy Jacksonville*. 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, several loops drawn from the Healthy Kids, Healthy Jacksonville 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 Jacksonville, Florida, each feedback loop tells a story about a more specific change process.

Figure 3: Active Transportation Feedback Loop




Causal Story for Feedback Loop

*Story A*: In this case , the story is about active transportation (red highlighted loop in Figure 3). Jacksonville, Florida partners supported the City of Jacksonville's 2030 Mobility Plan and the implementation of Context Sensitive Streets guidelines. Participants described how safe, quality bike and pedestrian infrastructure increased residents' active transportation, resulting in greater physical activity and less overweight and obesity. In turn, lower rates of overweight and obesity require less need for efforts to increase awareness and engage community residents around efforts to increase equitable distribution of resources for bike and pedestrian infrastructure (as it is already present).

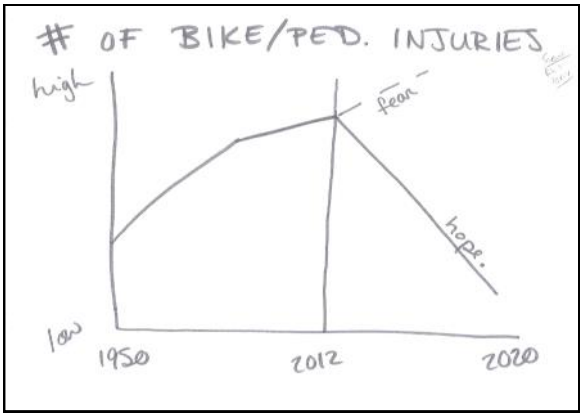
*Story B*: While the preceding story reflected a positive scenario for Jacksonville, Florida, the same feedback loop also tells the opposite story. A lack of bike and pedestrian infrastructure is a barrier to active transportation, minimizing physical activity and increasing overweight and obesity. Consequently, higher rates of overweight and obesity require increased awareness of the importance of active living initiatives. With greater awareness, community members can be more engaged to advocate for equitable distribution of resources to increase or improve bike and pedestrian infrastructure.

Balancing Loop and Notation

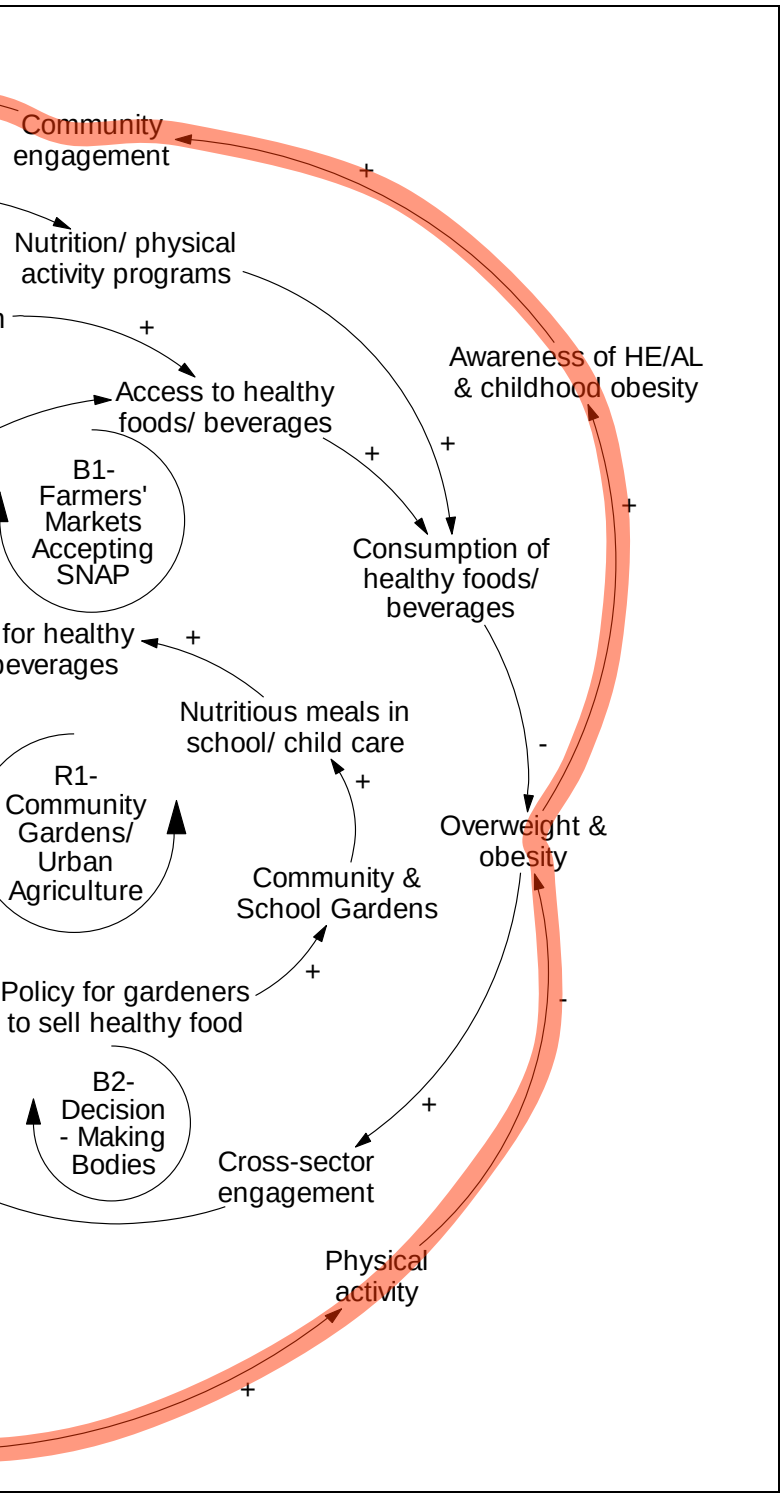
These stories represent a balancing loop, and the notation in the feedback loop identifies it as a balancing loop (see "B1 — Active Transportation (Mobility Plan)" and red highlighted loop in Figure 3). The words represent variables of quantities that increase and decrease as illustrated in the stories 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 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.

***"Based on the work that we've been involved in in the last two years, I think bike/ped access is going to increase. There seems to be a concerted community interest to make it work and make the connectivity for people to have other alternative modes of transportation. My fear is because there are other forces working against those interests, that maybe where we are at might be where we stay and not grow any farther after this." (Participant)***

In a balancing loop, the effect of the variables tend to create more of a stable trend over time, as opposed to one that is continually increasing or decreasing. This effect continues through the cycle and returns a stabilizing influence to the original variable, respectively.




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



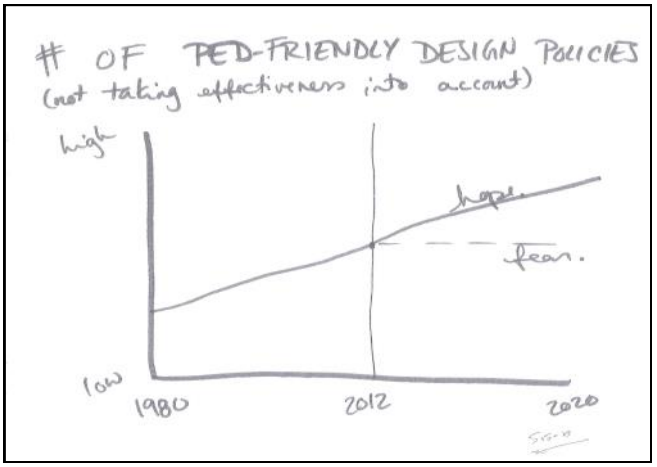

In isolation, this balancing loop represents the influence of bike and pedestrian infrastructure on physical activity on overweight and obesity. To understand other influences on these variables, it is important to remember that this reinforcing loop is only one part of the larger CLD (see Figures 1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

<u>System Insights for *Healthy Kids, Healthy Jacksonville*</u>

Participants also identified an increase in the number of bike and pedestrian injuries in Jacksonville, Florida since 1950 (see above behavior over time graph). Yet, since 1980, there has been an increase in pedestrian-friendly design policies (see below behavior over time graph).

From the systems thinking exercises, several insights can inform the partners' continued efforts to increase active transportation. For instance, safe, quality bike and pedestrian infrastructure can reduce injuries in addition to increasing physical activity in residents.

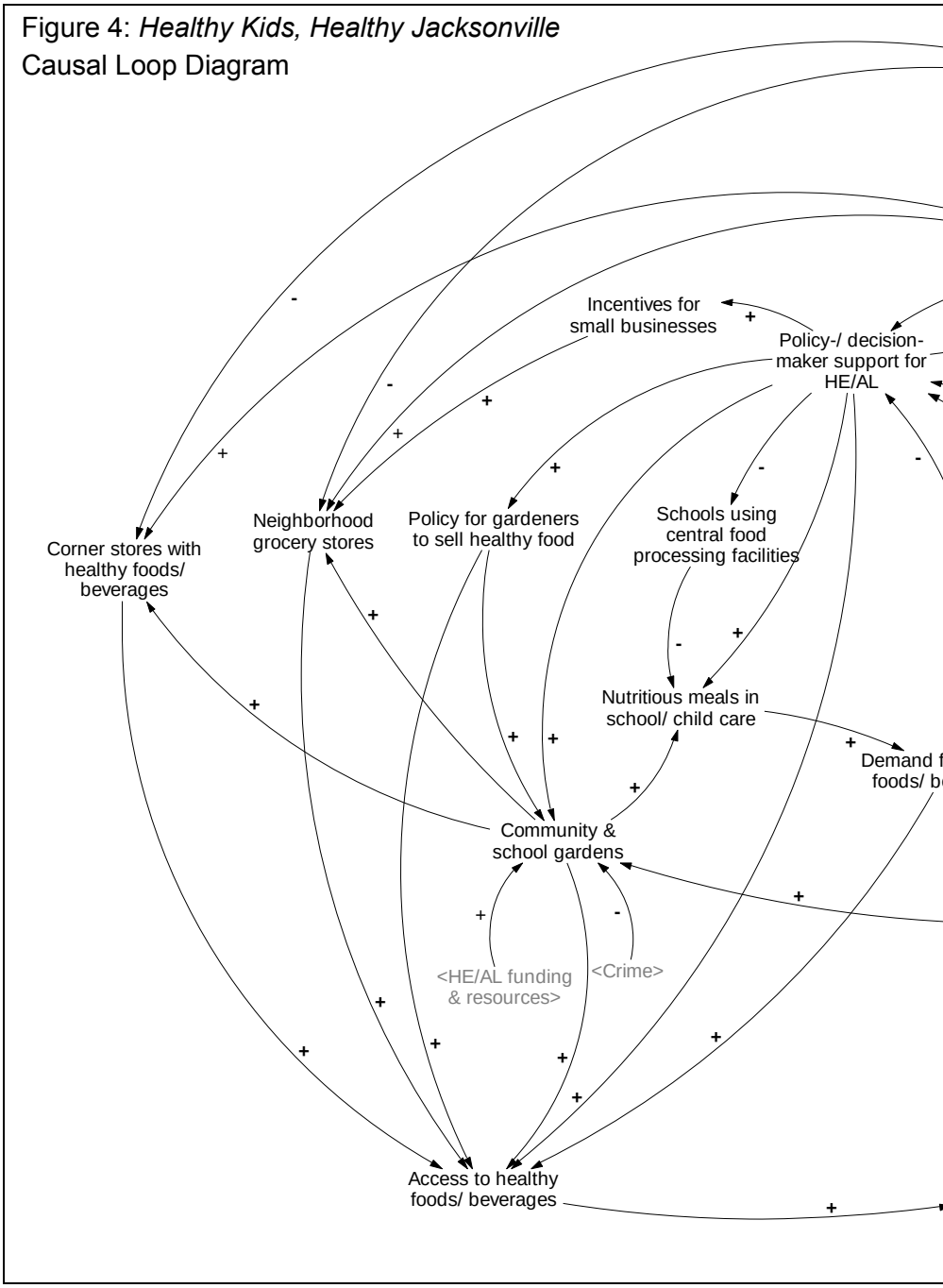
In addition to these insights, systems thinking can also help to pose key questions for assessment and evaluation, including methods and measures for assessing equitable distribution of bike and pedestrian infrastructure and pedestrian-friendly design policies.



**Opportunities for Systems Thinking in Jacksonville, Florida**

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 *Healthy Kids, Healthy Jacksonville* partners, this storybook also summarized the healthy eating, active living, partnership and community capacity, social determinants, and health and health behaviors subsystems in the Jacksonville causal loop diagram as well as an example feedback loop corresponding to the partnership's primary strategies.

Figure 4: *Healthy Kids, Healthy Jacksonville* 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.

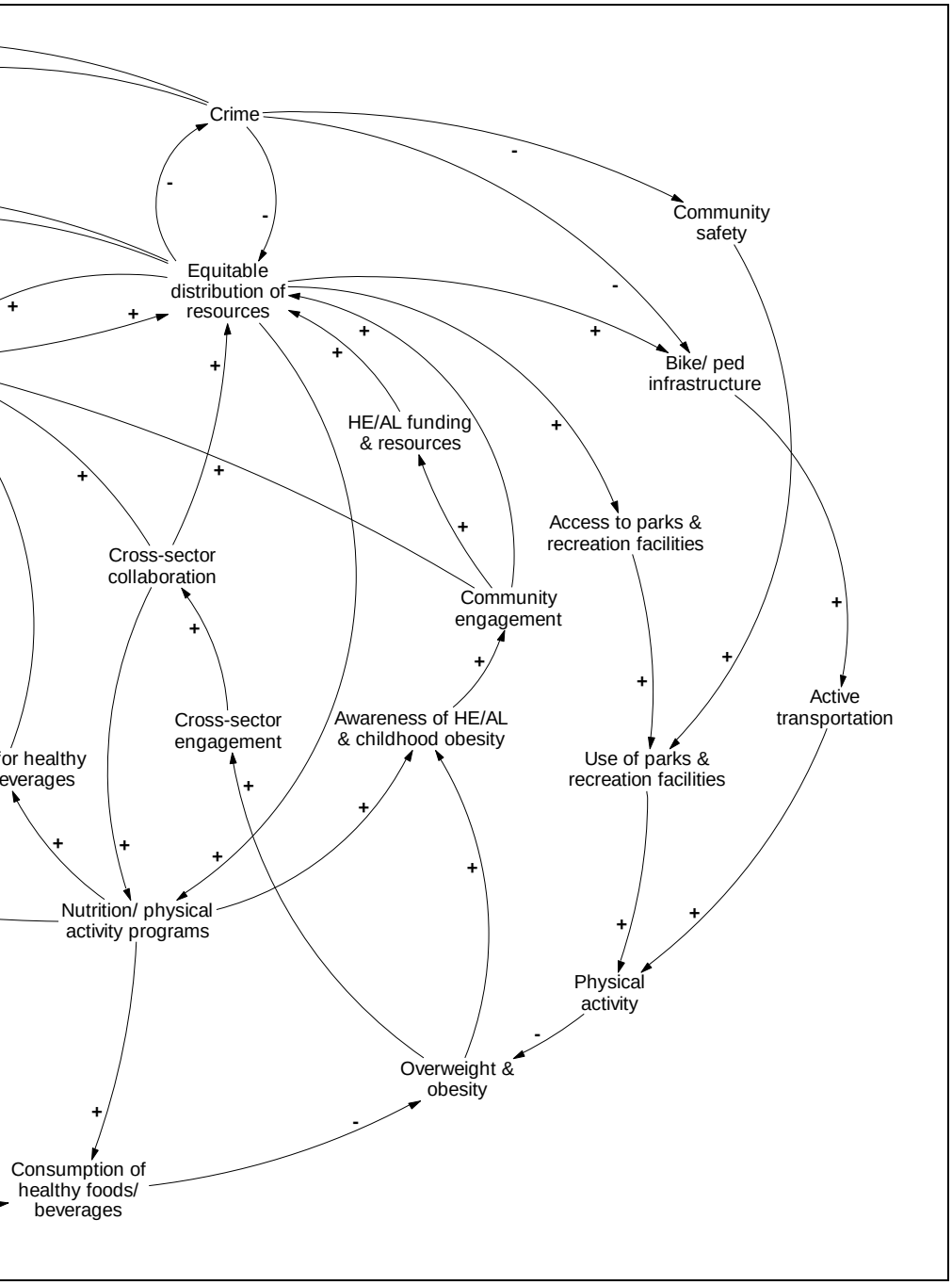
This represented a first attempt to collectively examine the range of things that affect or are affected by policy, system, and environmental changes in Jacksonville, Florida to promote healthy eating and active living as well as preventing childhood overweight and obesity.

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

- the participants represent a sample of the *Healthy Kids, Healthy Jacksonville* 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 corporate food retail, artificial additives & GMOs in foods/beverages, affordability of health foods/beverages, nutritional education/counseling (school, health care), language/cultural barriers, suburban sprawl, physical education in school, share the road education, racial discrimination, policies for public transportation & bike/ped infrastructure, mental/emotional health, academic performance, bike/ped injuries, schools in neighborhoods, poverty, connectivity of alternative transportation modes, access to sugar-sweetened beverages, fast food restaurants, demand for fast food; 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 Jacksonville 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 *Healthy Kids, Healthy Jacksonville* 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/

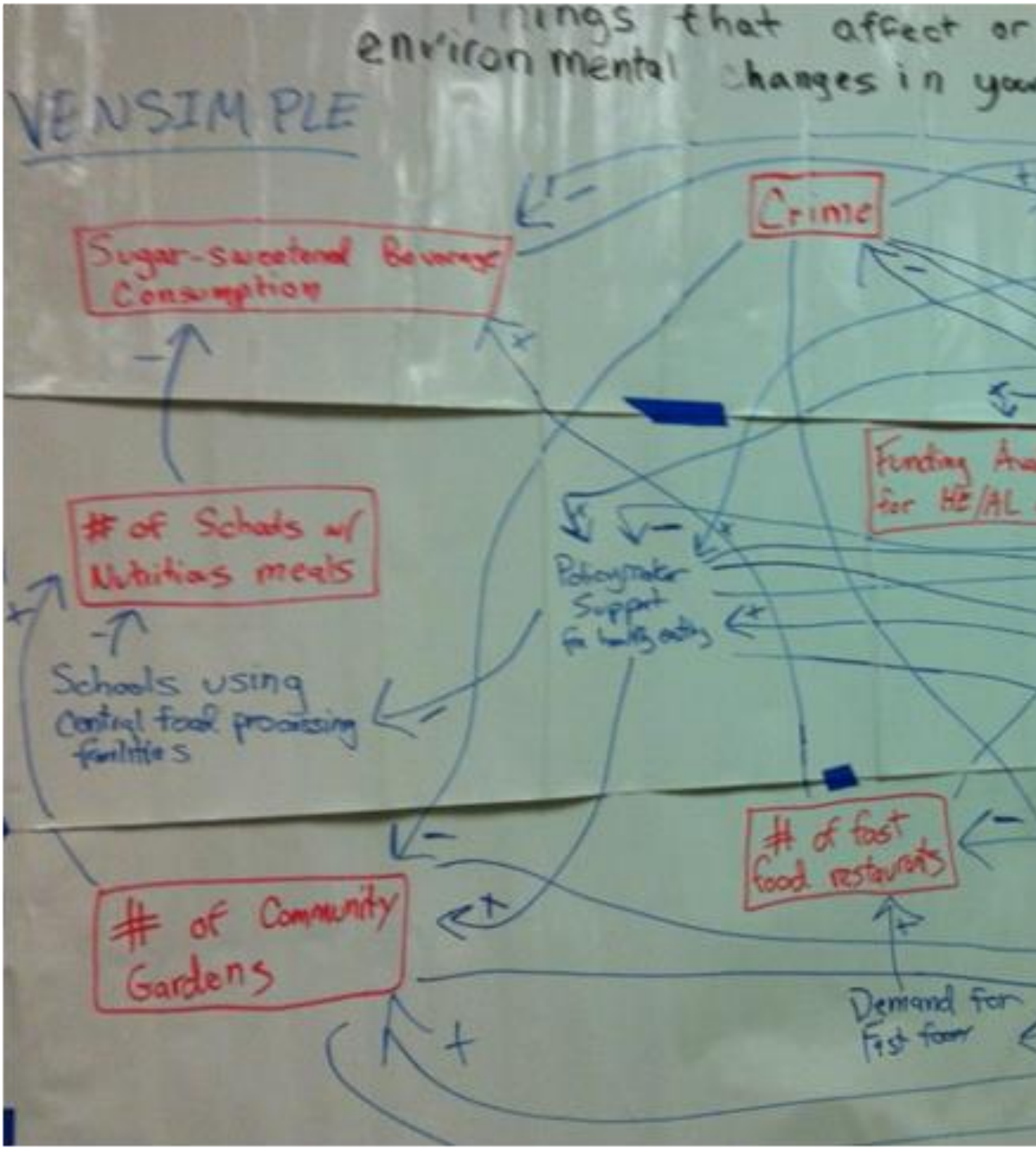
Vennix, J. (1996). Group model building. New York, John Wiley & Sons.

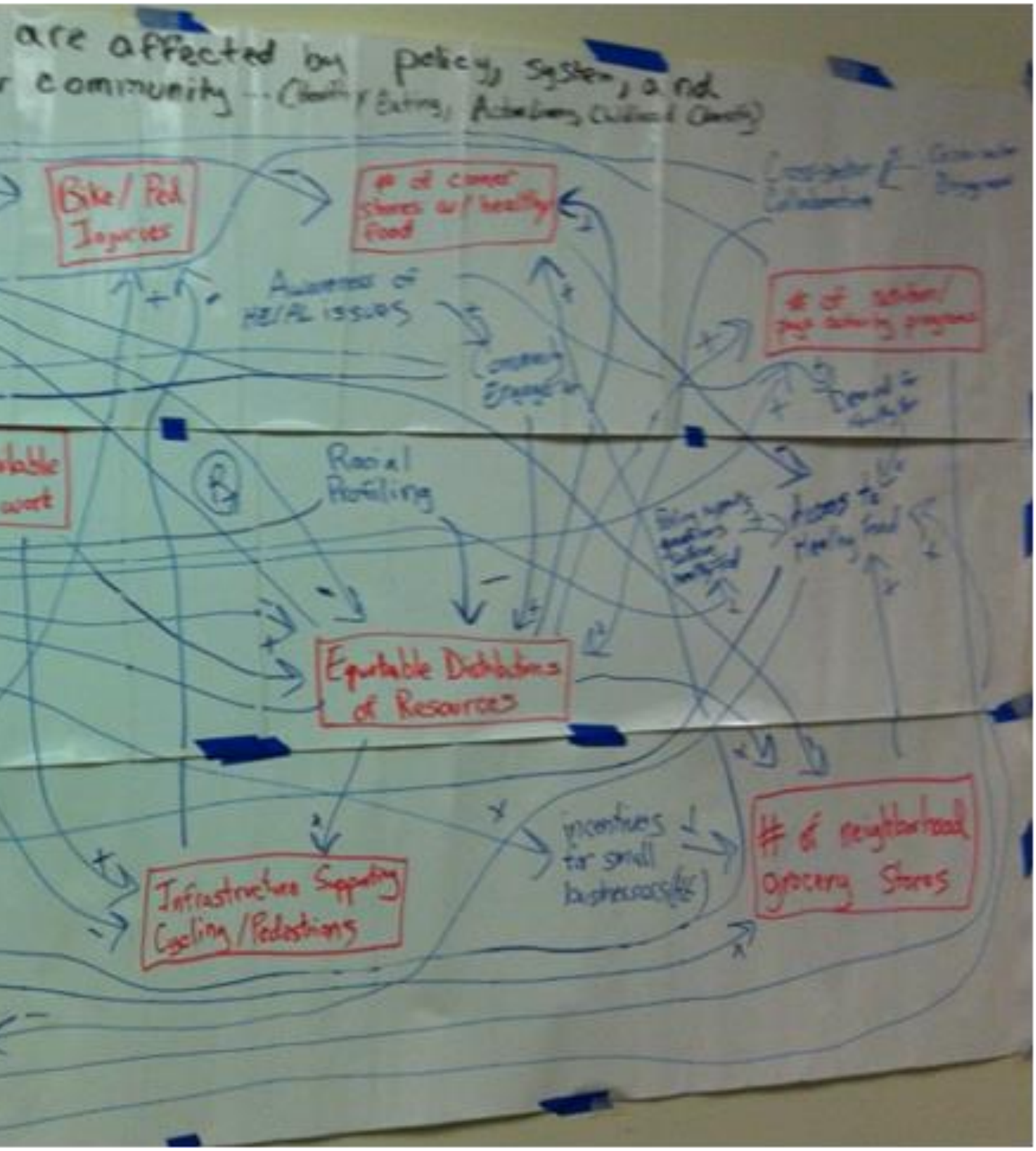
Zagonel, A. and J. Rohrbaugh (2008). Using group model building to inform public policy making and implementation. Complex Decision Making. H. Qudart-Ullah, J. M. Spector and P. I. Davidsen, Springer-Verlag: 113-138.

**Appendix A: Behavior Over Time Graphs Generated during Site Visit**

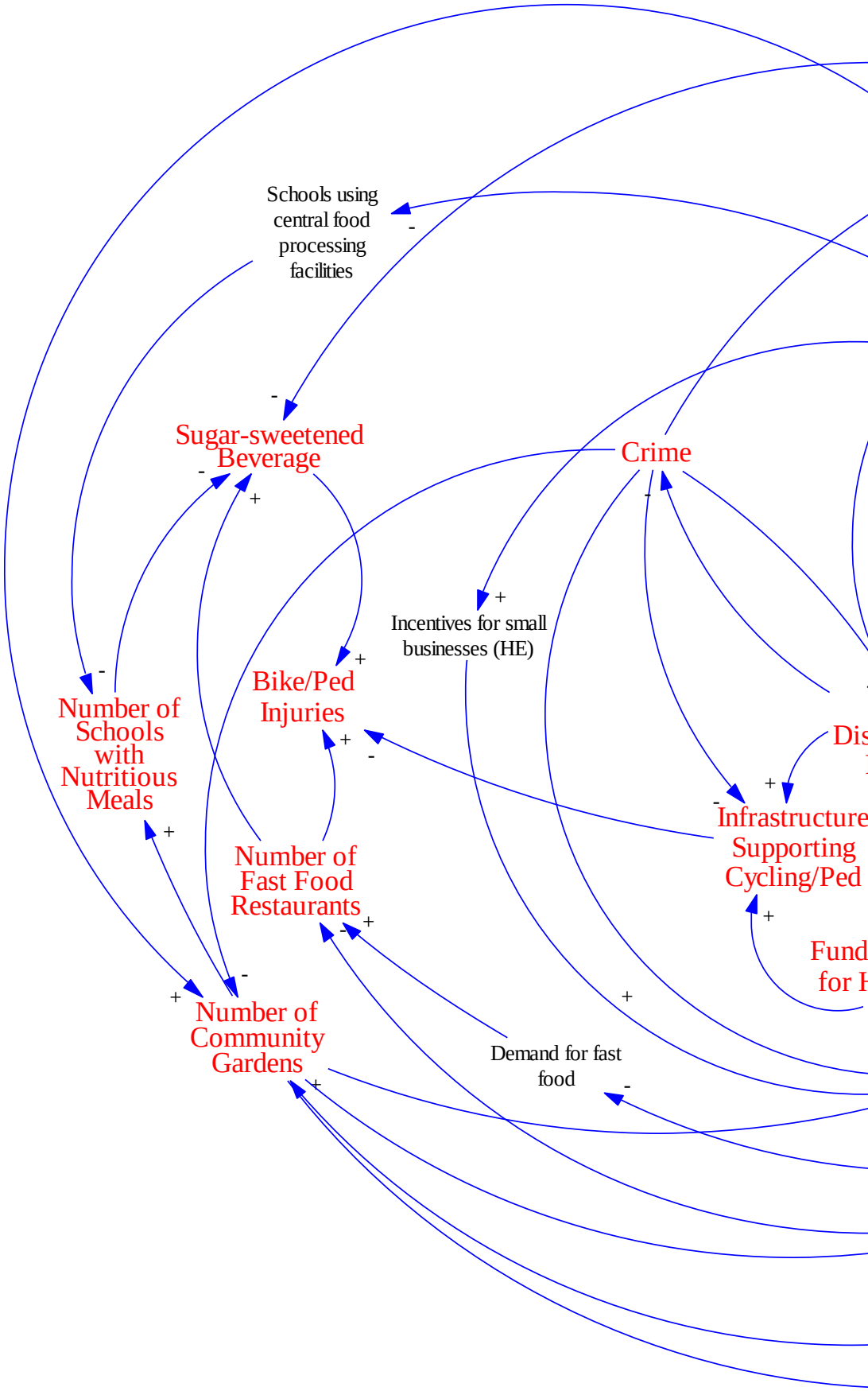
| **Jacksonville, Florida: *Healthy Kids, Healthy Jacksonville*** | |
|---|---|
| **Categories** | **Number of Graphs** |
| Active Living Behavior | 2 |
| Active Living Environments | 4 |
| Funding | 1 |
| Healthy Eating Behavior | 2 |
| Healthy Eating Environments | 8 |
| Marketing and Media Coverage | 0 |
| Obesity and Long Term Outcomes | 0 |
| Partnership & Community Capacity | 0 |
| Policies | 3 |
| Programs & Promotions (Education and Awareness) | 3 |
| Social Determinants of Health | 4 |
| **Total Graphs** | **27** |

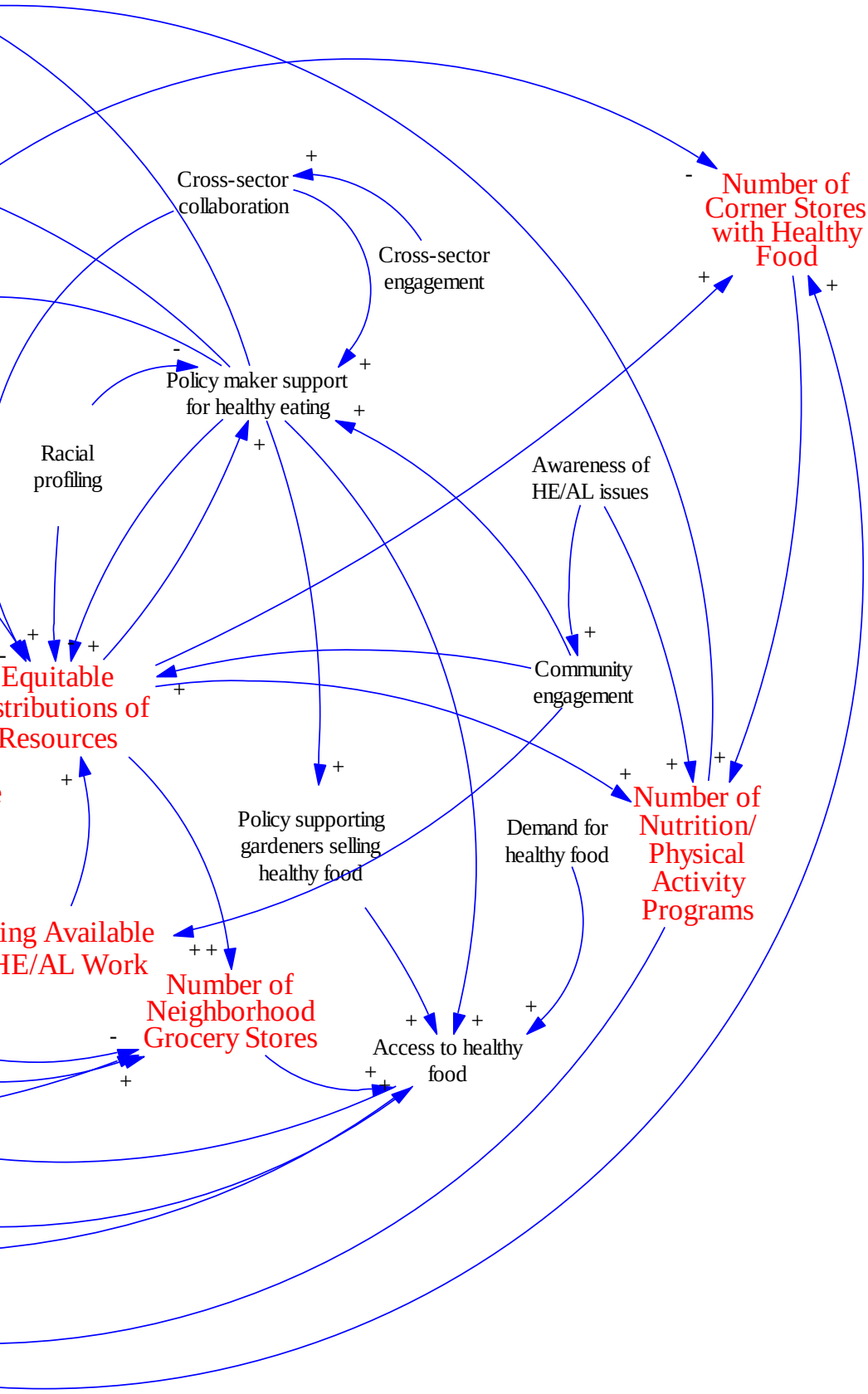
**Appendix B: Photograph of the Original Version of the *Healthy Kids, Healthy Jacksonville* Causal Loop Diagram**



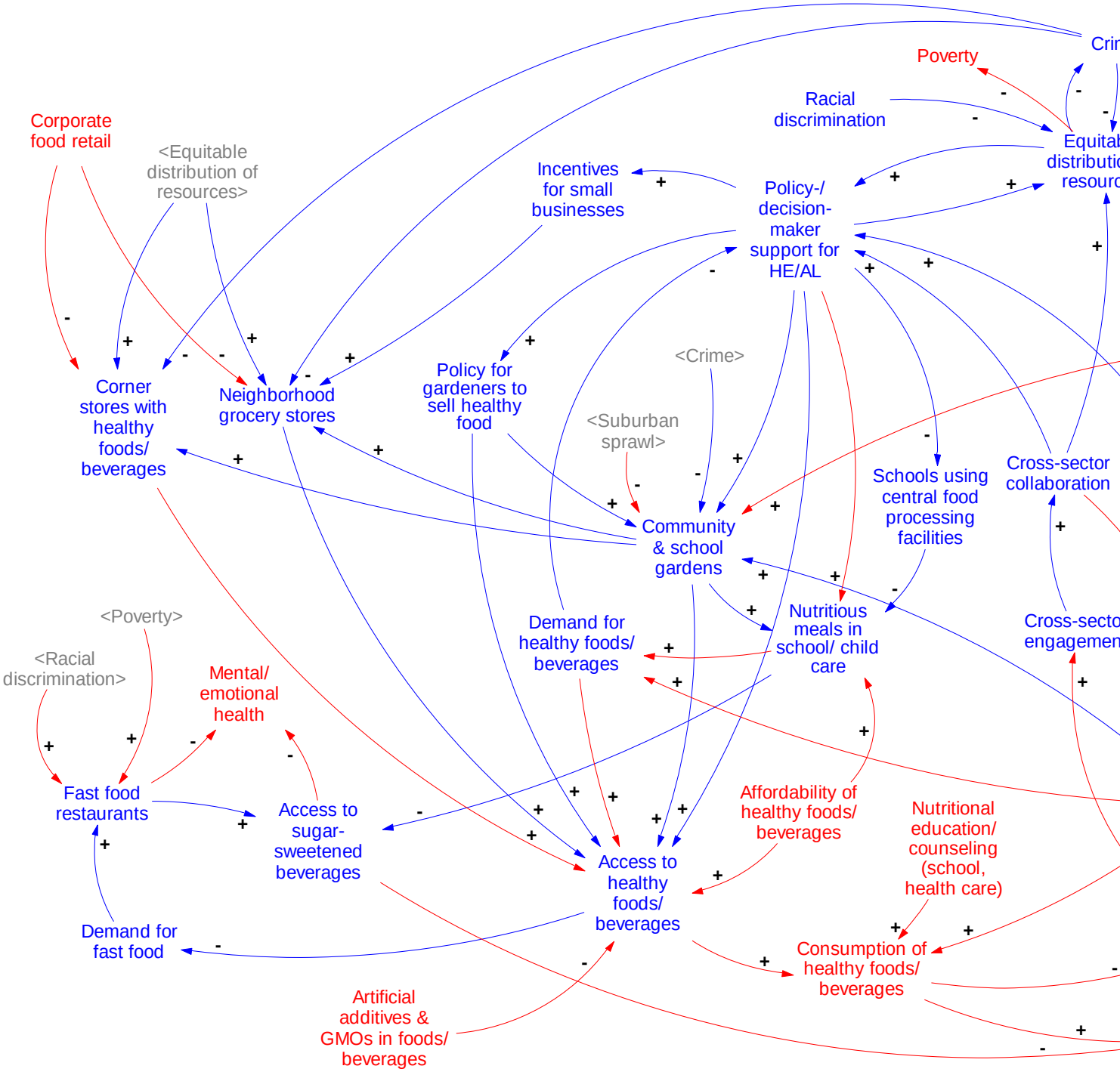

are affected by policy, system, and
community
Bike/Ped Injuries
# of corner stores w/ healthy food
Racial Profiling
Equitable Distribution of Resources
Infrastructure Supporting Cycling/Pedestrians
incentives for small
# of neighborhood
Grocery Stores

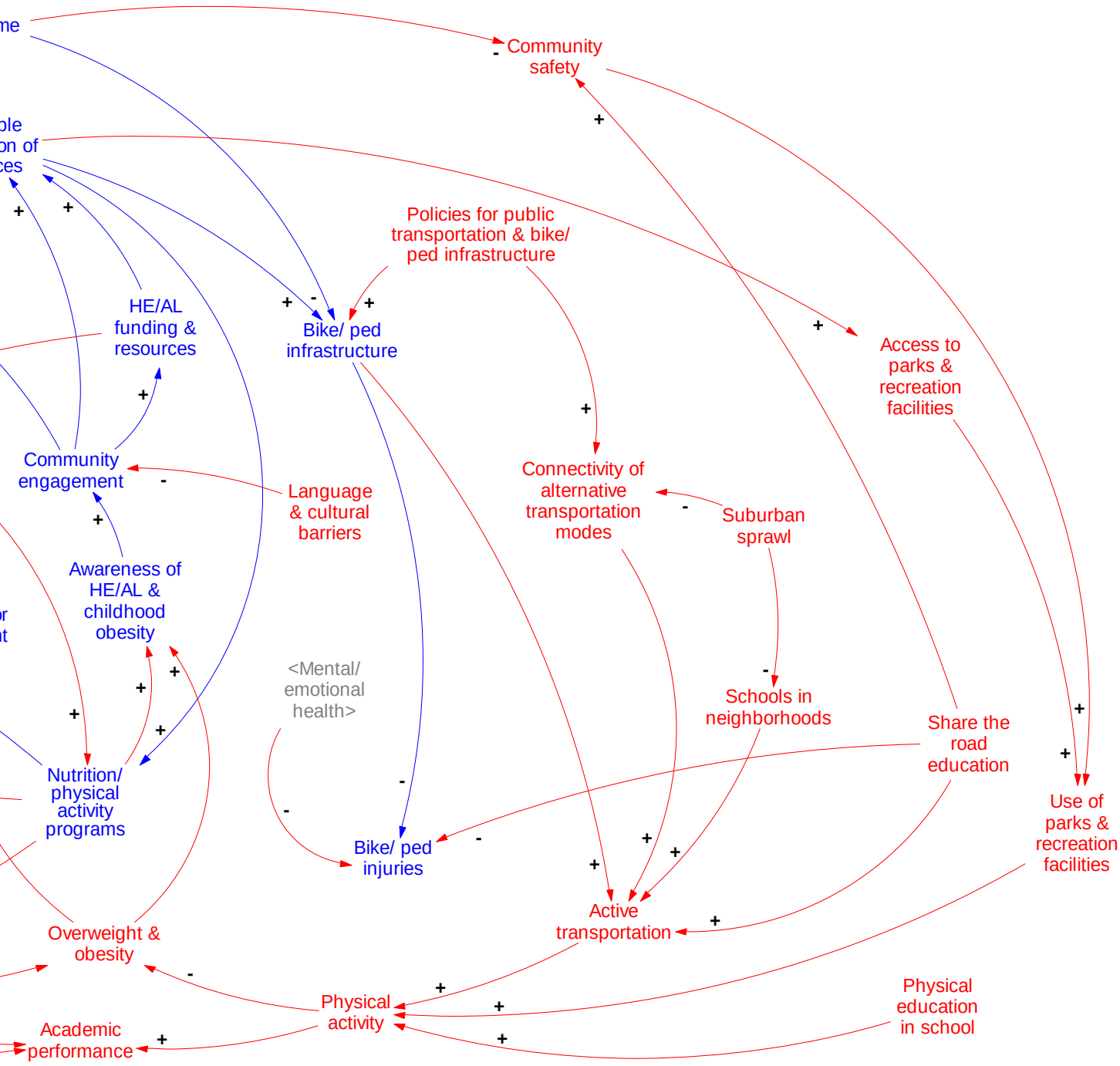
**Appendix C: Original Translation of the Causal Loop Diagram into Vensim PLE**



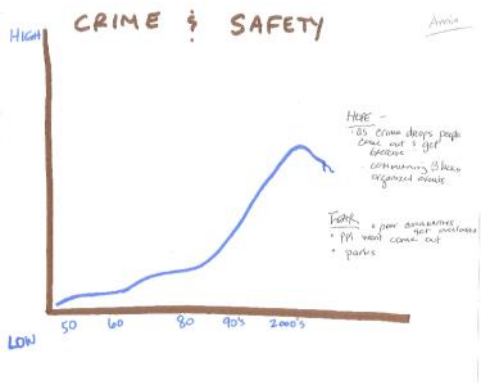

Cross-sector collaboration
Cross-sector engagement
Number of Corner Stores with Healthy Food
Policy maker support for healthy eating
Racial profiling
Awareness of HE/AL issues
Equitable stributions of Resources
Community engagement
Policy supporting gardeners selling healthy food
Demand for healthy food
Number of Nutrition/ Physical Activity Programs
ing Available HE/AL Work
Number of Neighborhood Grocery Stores
Access to healthy food

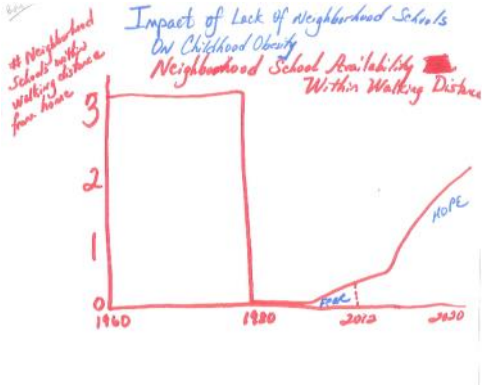
**Appendix D: Transcript Translation of the Causal Loop Diagram into Vensim PLE**

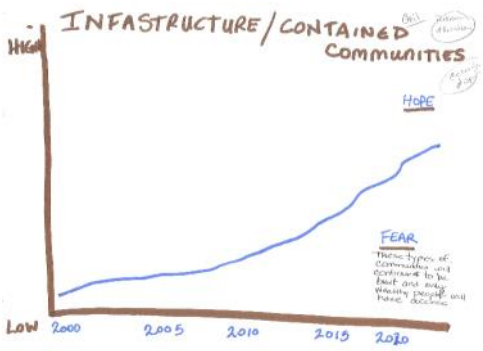


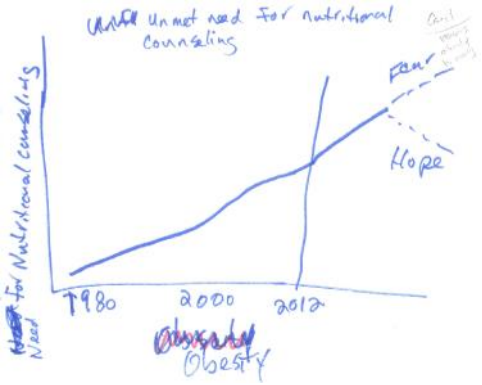

me
ble
on of
ces
Community safety
Policies for public transportation & bike/ ped infrastructure
HE/AL funding & resources
Bike/ ped infrastructure
Access to parks & recreation facilities
Community engagement
Language & cultural barriers
Connectivity of alternative transportation modes
Suburban sprawl
Awareness of HE/AL & childhood obesity
<Mental/ emotional health>
Schools in neighborhoods
Share the road education
Use of parks & recreation facilities
Nutrition/ physical activity programs
Bike/ ped injuries
Active transportation
Overweight & obesity
Physical activity
Physical education in school
Academic performance

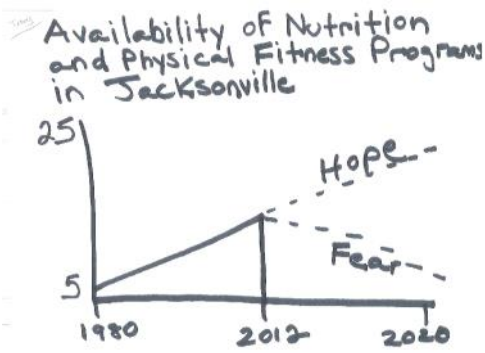
**Appendix E: Behavior Over Time Graphs not Represented in the Storybook**

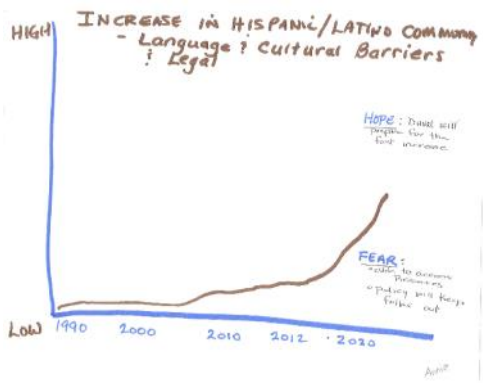


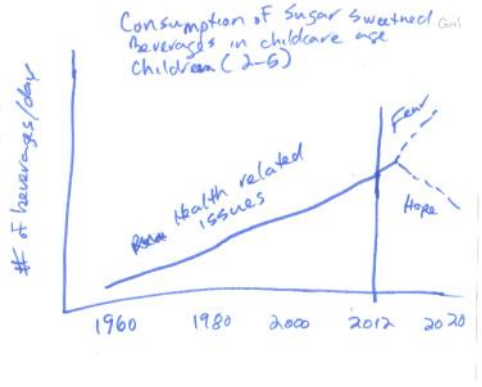



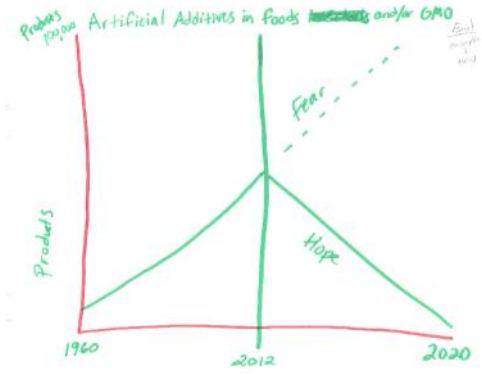



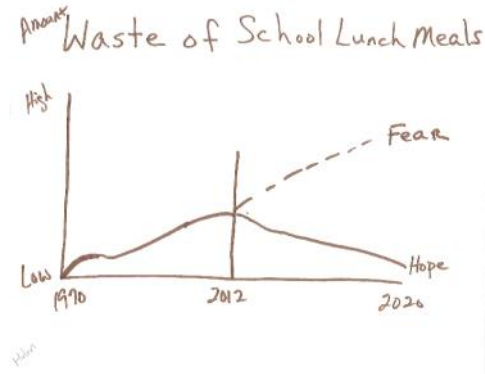



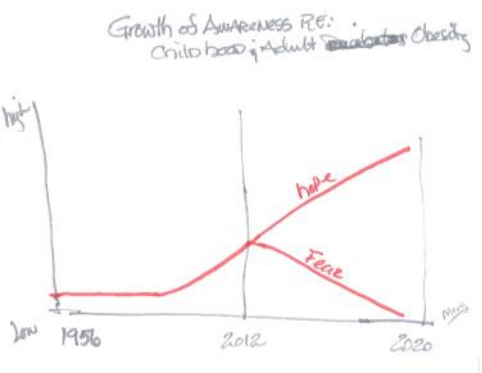



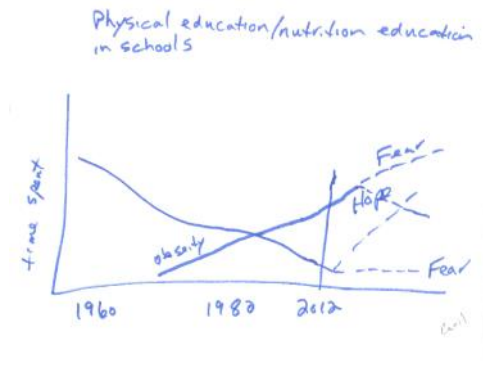



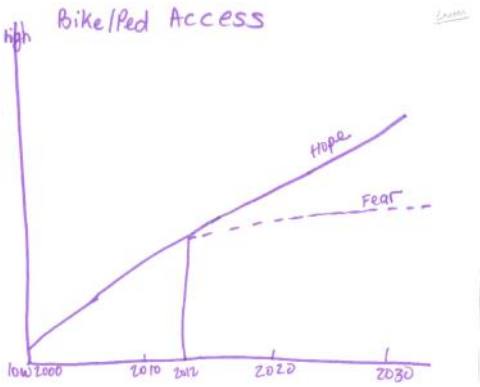



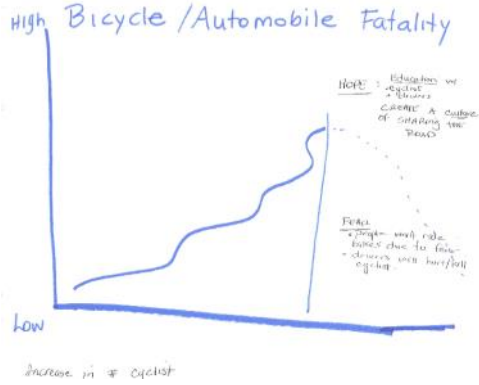



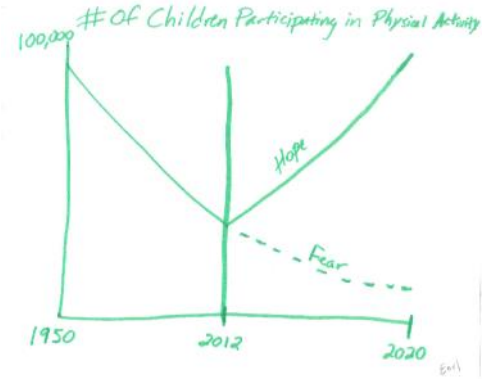



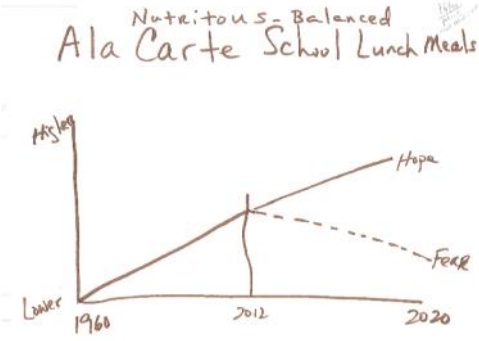


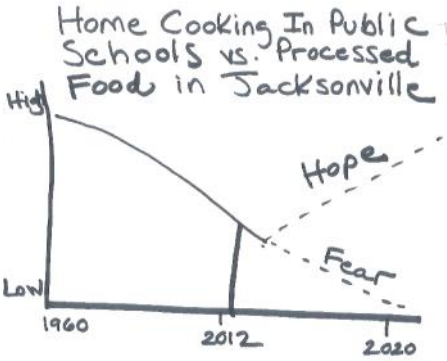

Bike/Ped Access
high
Hope
Fear
low 2000
2010
2012
2020
2030


High
Bicycle /Automobile Fatality
Hope
Fear
Low
Increase in # cyclist

Family Community Activity
Hope
Fear
low
2005
2012
2025


# Of Children Participating in Physical Activity
100,000
Hope
Fear
1950
2012
2020


Nutritous_Balanced
Ala Carte School Lunch Meals
Hope
Fear
Lower
1960
2012
2020


Home Cooking In Public Schools vs. Processed Food in Jacksonville
High
Hope
Fear
Low
1960
2012
2020