

# Using Systems Science to Engage Communities in Obesity Prevention

## *A Focus on Community Coalitions*

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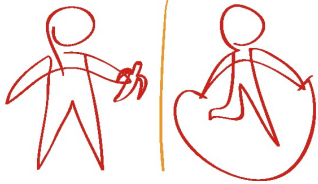
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**Friedman School of Nutrition Science and Policy  
Tufts University**

# Outline

- **Shape Up Somerville**
  - **Engaging a coalition for community change**
- COMPACT study
  - How and why does a coalition succeed?
- Systematic Review
  - Lessons on the impact of coalition engagement
- Shape Up Somerville Retrospective Study
  - Collecting data and refining measurement tools to study a coalition's work
- Shape Up Under 5 Prospective Study
  - Working upstream with an early childhood coalition

# Shape up Somerville (2002-2005)



Shape Up Somerville:  
Eat Smart. Play Hard.

**LOCAL  
GOVERNMENT**

**HOME**

Parent, Child,  
Family

**MEDIA**

**SCHOOL**

Child, Teachers,  
Administration,  
Staff

**HEALTHCARE**

**COMMUNITY**

Restaurants,  
ethnic groups,  
afterschool  
programs, rec

R06/CCR121519-01 from the Centers for Disease Control and Prevention.  
Additional support by Blue Cross Blue Shield of Massachusetts, United Way of Mass Bay, The US Potato Board, Stonyfield Farm, and Dole Foods

# Shape up Somerville: results

## DECREASED

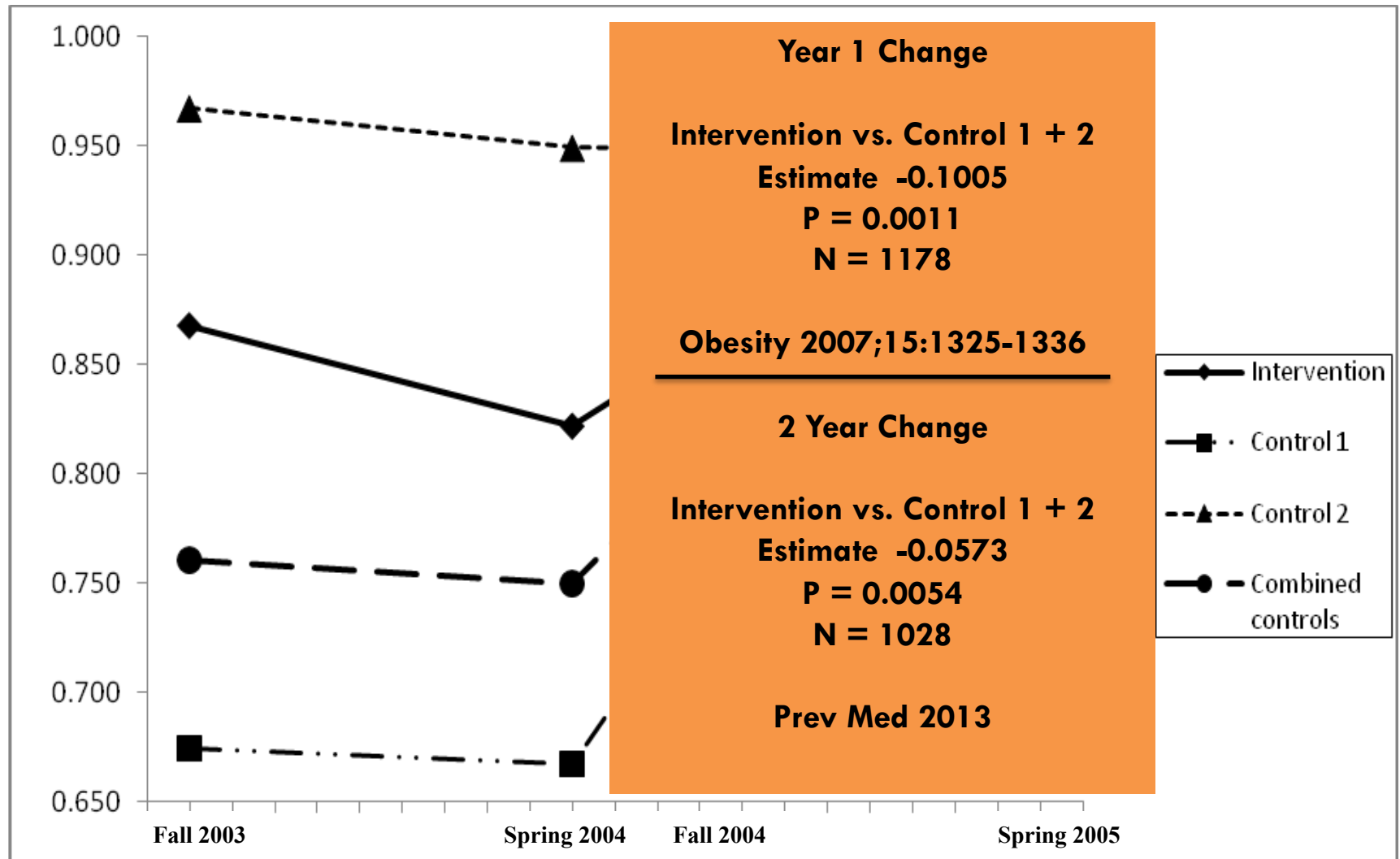
- BMI-z score
- Obesity prevalence
  - Children
  - Parent spillover
- Sugary drink intake
- Screen time

## INCREASED

- Sports and activities
- Policy change
- Healthy restaurant meals
- Overhaul of school food and competitive foods

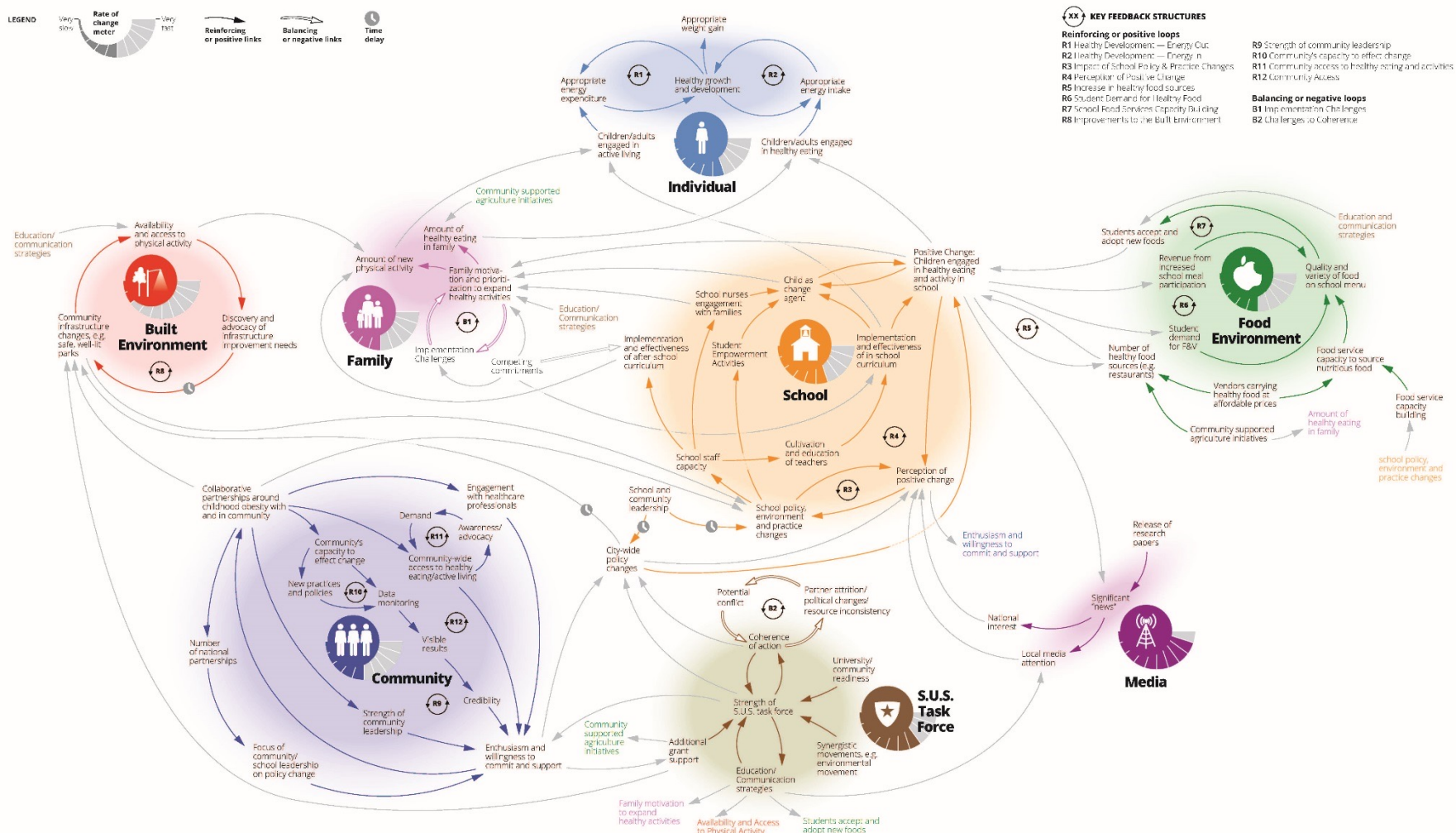


# RESULTS: BMI z-score at 4 Time Points



**N = 922**

# Shape Up Somerville: The Dynamics of Community Change

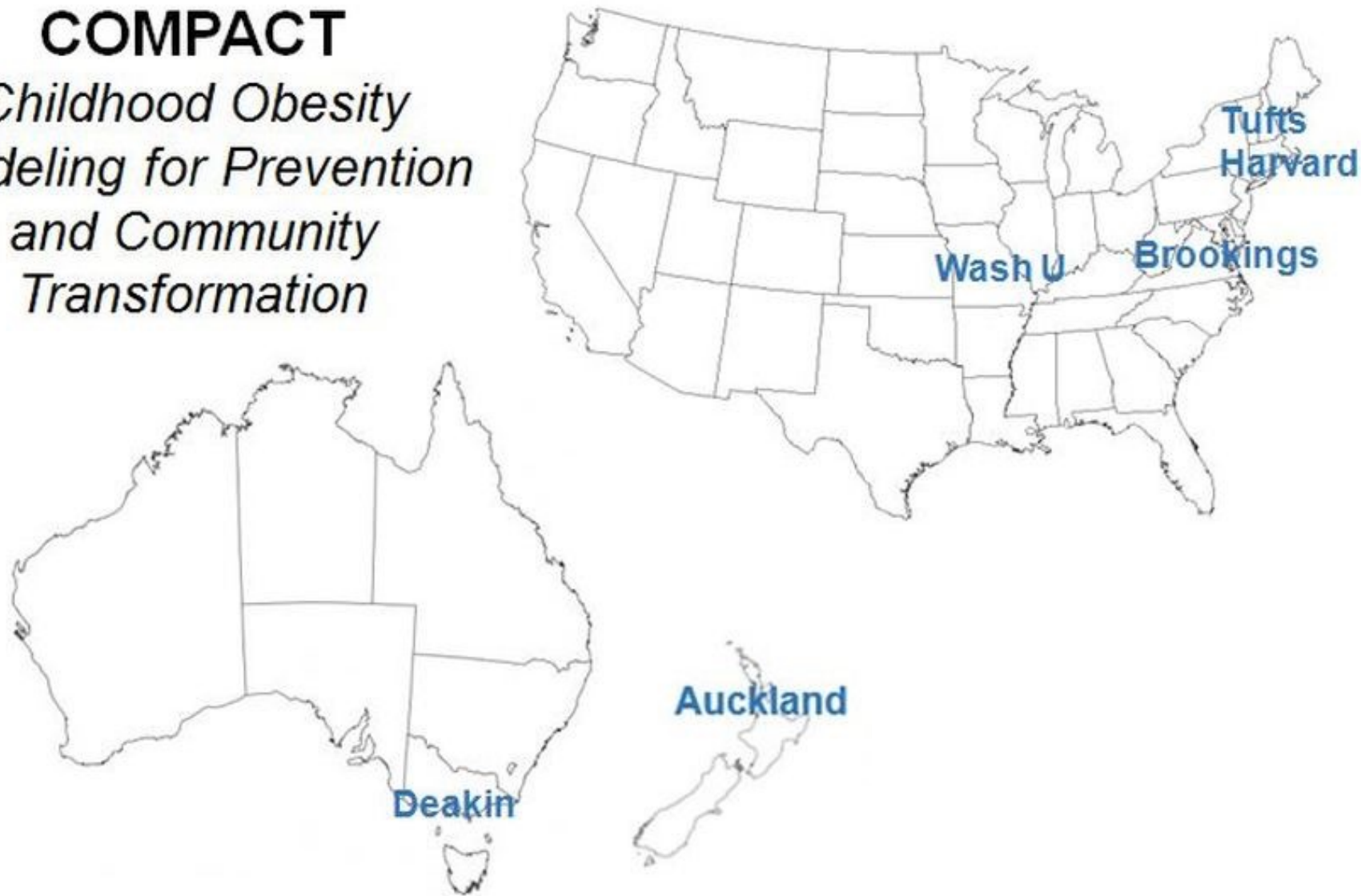


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# COMPACT

*Childhood Obesity  
Modeling for Prevention  
and Community  
Transformation*



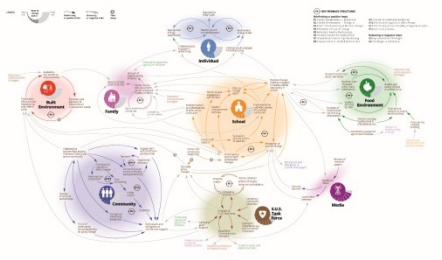
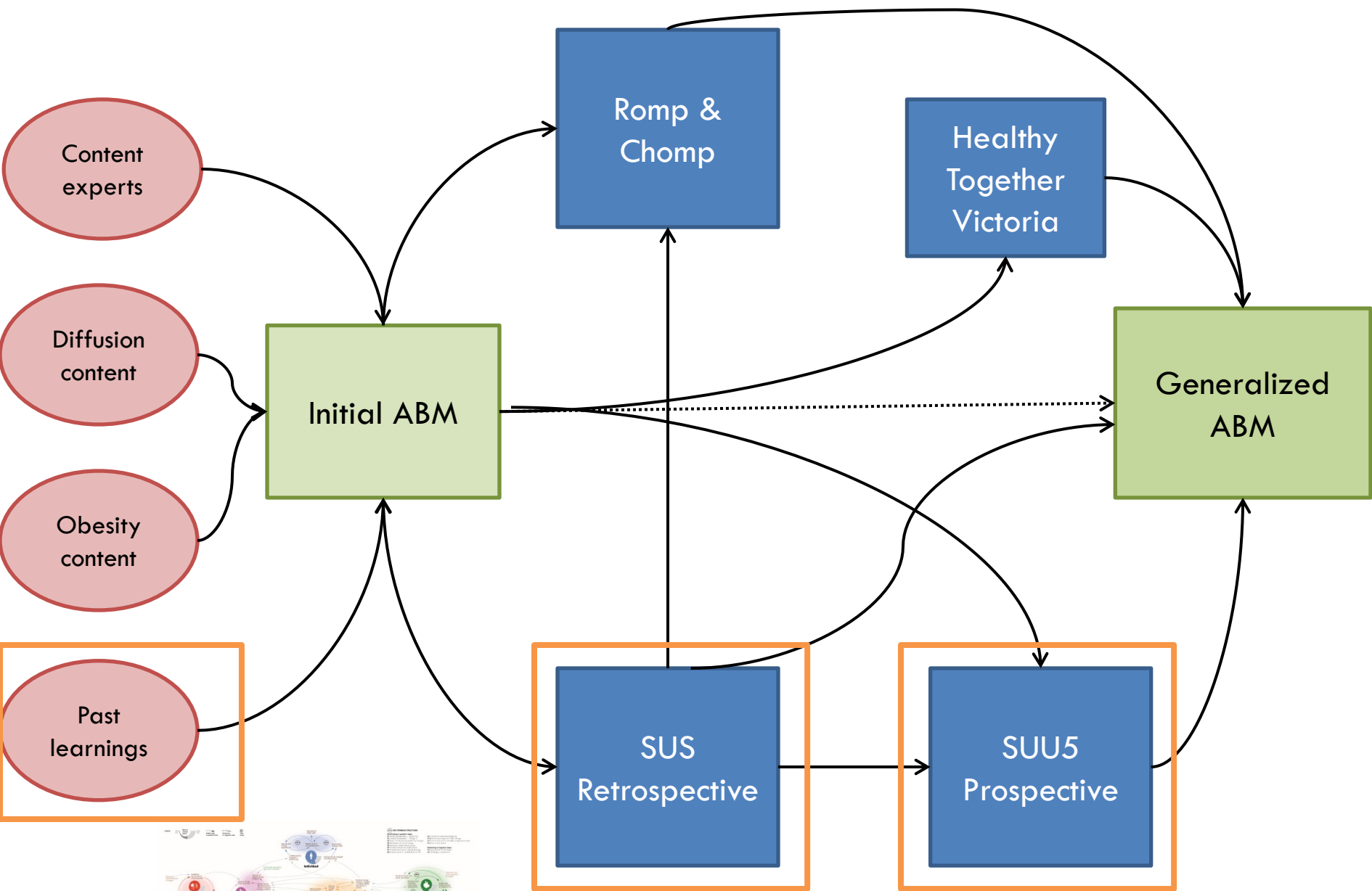
Childhood Obesity Modeling for Prevention and Community Transformation (COMPACT)  
with support from the NHLBI & OBSSR . NIH grant #R01HL115485

# To understand what works, for whom, and under what circumstances – process, dynamics, connections

1. Study other whole-of-community interventions: *systematic review*
2. Learn from successful, completed whole-of-community intervention: *Shape Up Somerville and Romp and Chomp Retrospective Studies*
3. Plan, design, and conduct a new intervention focused on children ages 0-5 years: *Shape Up Under 5*
4. Develop and refine Agent Based Model and measurement tools for knowledge and engagement around obesity prevention
5. Understand and leverage existing systems within a community to implement an upstream approach to obesity prevention
6. Develop cost efficient\* / effective\*\* strategies & interventions



\*being effective without wasting time or effort or expense; \*\*the degree to which something is effective or productive in relation to its cost





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# **Engaging community partners in childhood obesity prevention interventions: a systematic review**

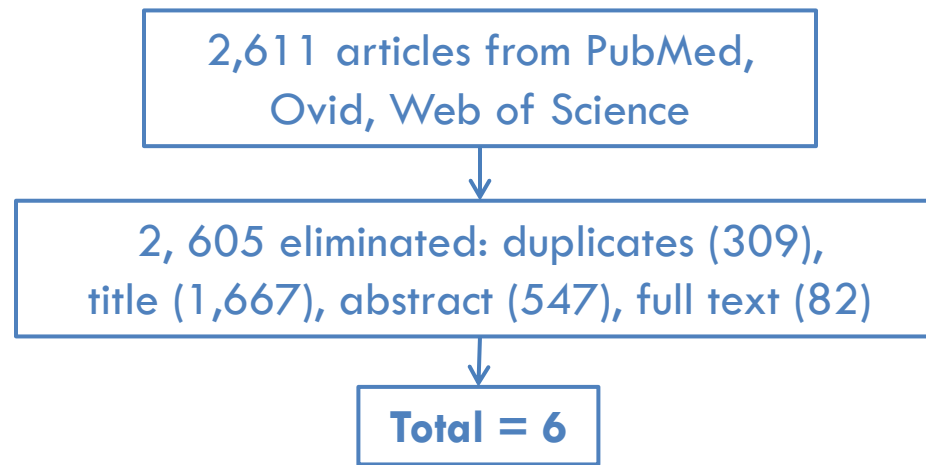
**Aim:** to summarize the impact of engaging groups of community partners (coalitions, steering committees, advisory boards, etc.) in the research process of childhood obesity prevention interventions

## **Search strategy:**

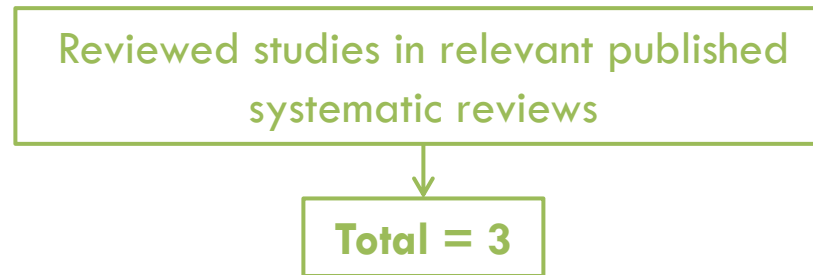
- 3 databases
- Intervention studies with multi-setting or whole-of-community approach
- Outcome measures (biology, behavior, environment or policy change)
- Community coalition very involved

**Original data collection:** surveys and interviews with study PIs to gather information beyond the peer-reviewed literature on coalition history, leadership, interactions, and impact

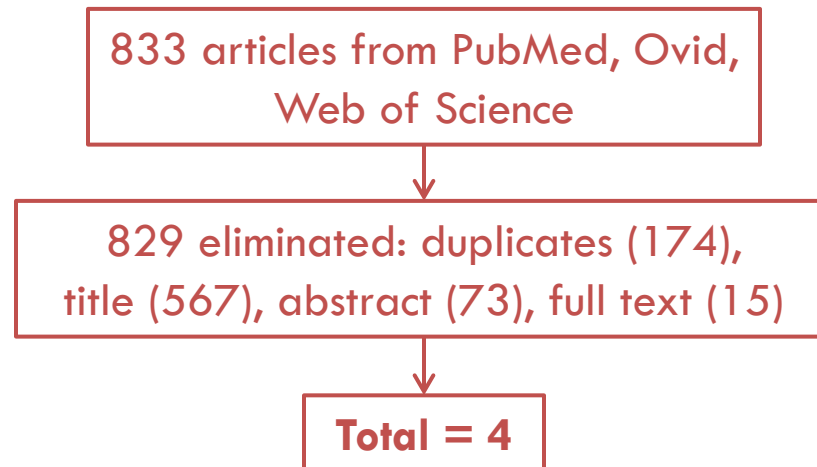
**Search 1:  
Oct. 2015**



**Search 2:  
Oct.-Nov. 2016**



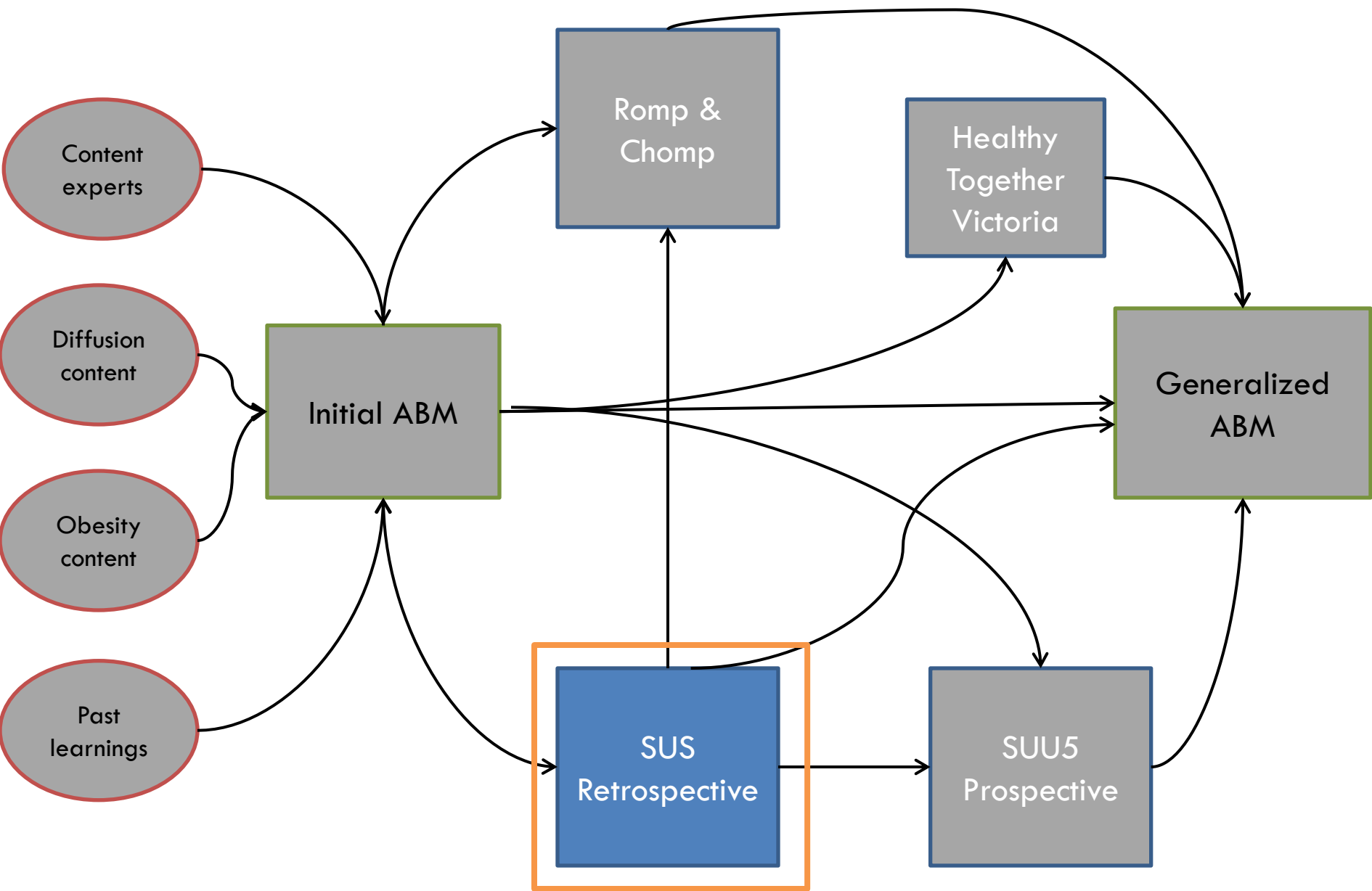
**Search 3:  
Jan. 2017**  
*(Update from Oct. 2015)*



**TOTAL = 13**  
***Original data collection  
with study PIs***

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# Retrospective: Shape Up Somerville

- Original: 2002-2005; Follow-up 2015
- Identified 25 Steering Committee members
  - 23 recruited; 15 consented; 13 full responses
- Collected recall data on
  - Knowledge of childhood obesity prevention\*
  - Engagement with the issue\*
  - Intervention network ties\*
  - Involvement in planning and implementation of intervention activities and policies

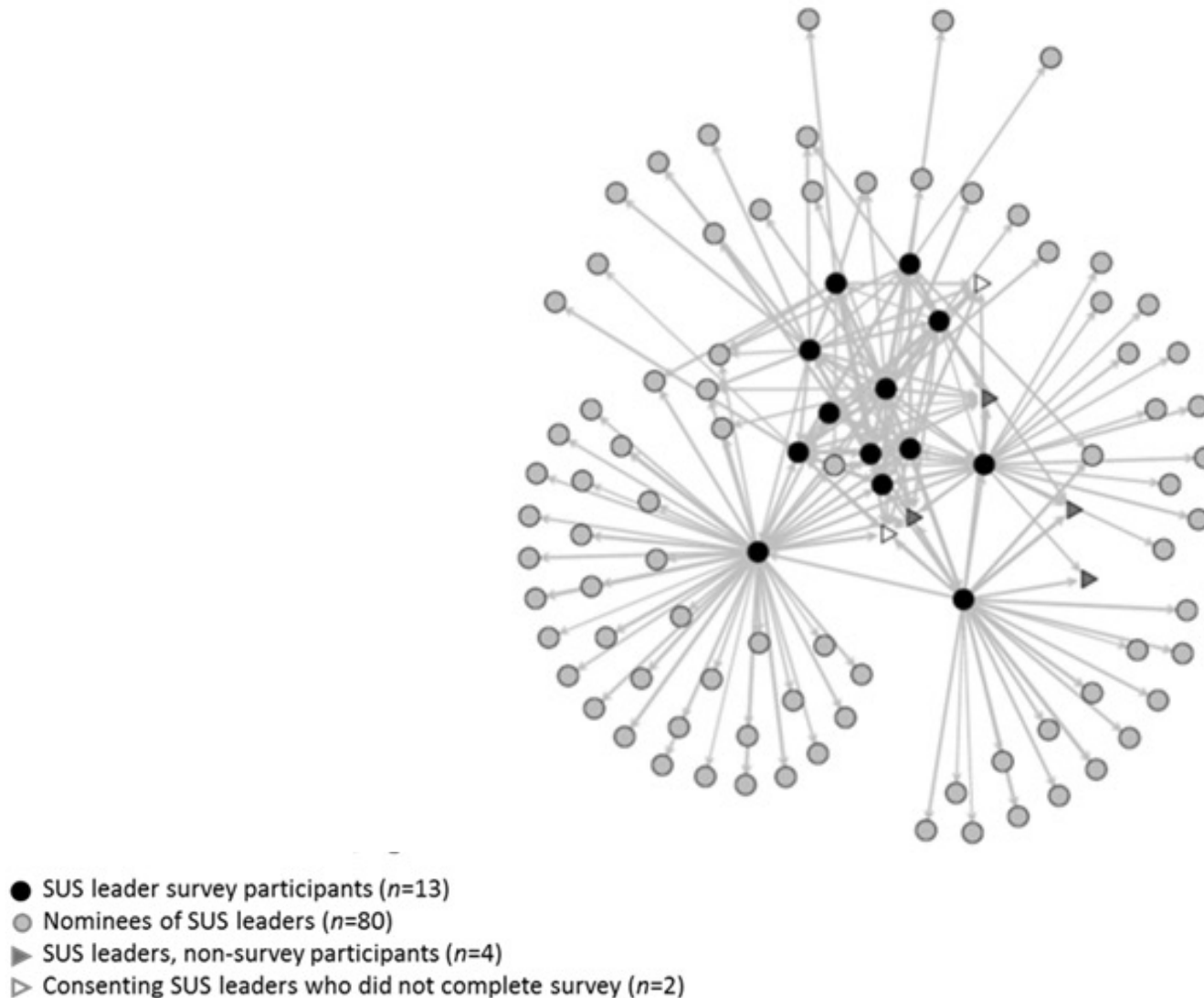
\*At 2 time points – beginning and end of involvement in SUS intervention



**SHAPE UP  
SOMERVILLE**



# SUS leadership network (2002 – 2005)

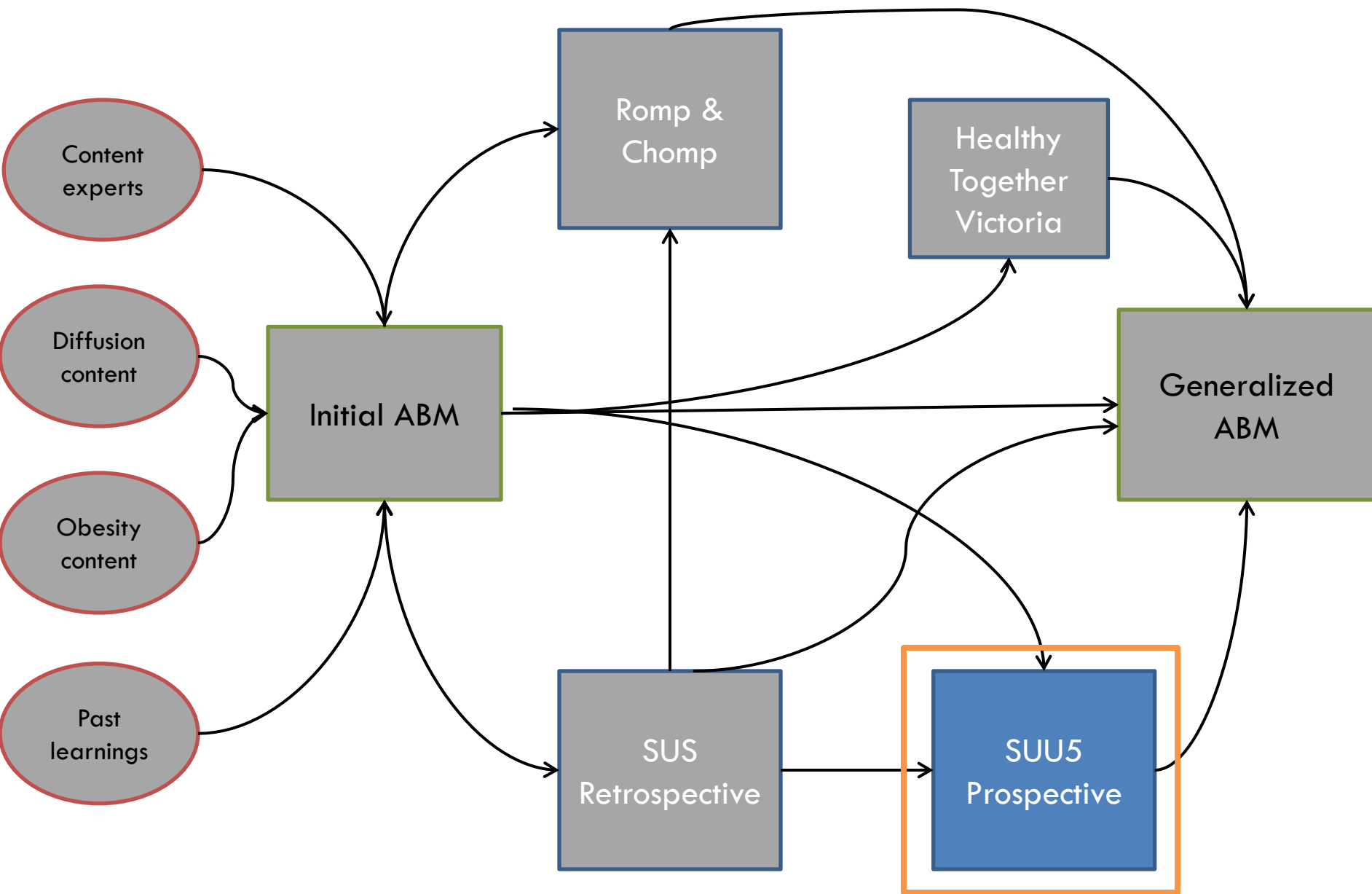


# SUS Retrospective: Implications and takeaways

- Developed new tool to capture knowledge, engagement, and social networks (KEN)
- Populated Agent Based Model (ABM)
  - Informed Shape Up Under 5 Committee selection
- Confirmed international similarities in whole-of-community approaches used in Shape Up Somerville and Romp & Chomp

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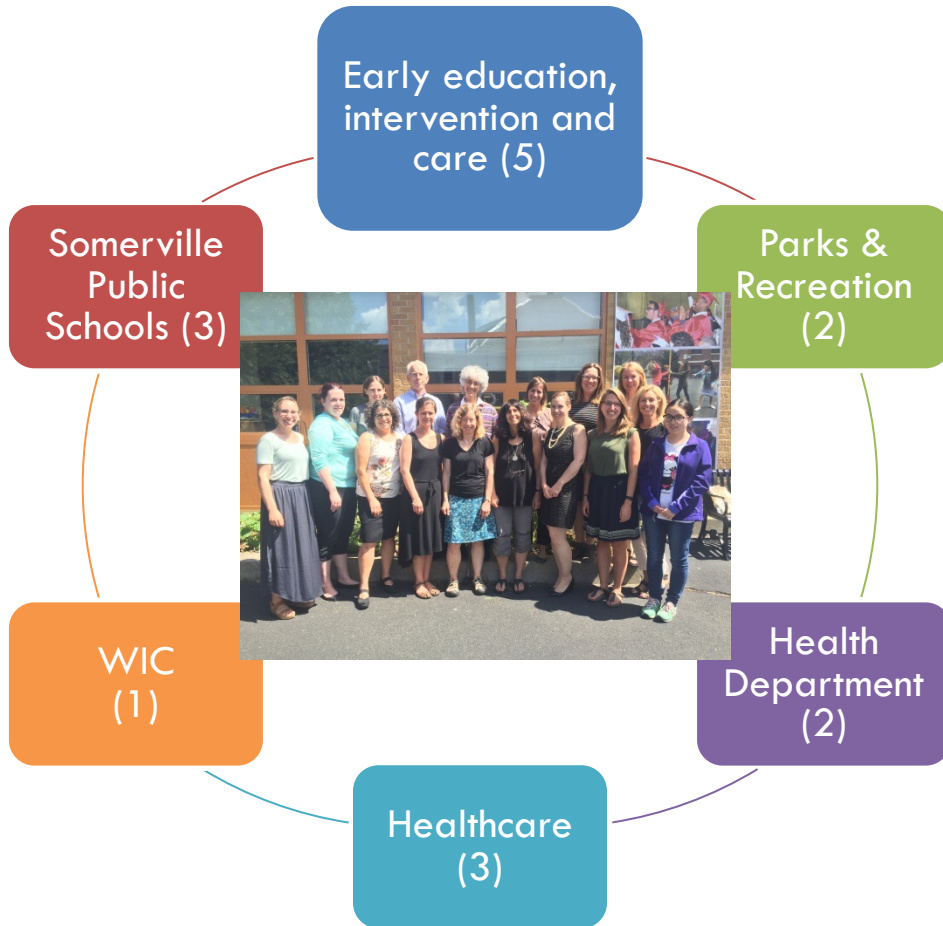


# Prospective : Shape Up Under 5

- 2015 – 2017
- Committee of 16 early childhood professionals and leaders (birth – 5 years), convened 16 times over 20-month period
- Upstream approach to obesity prevention
- Systems Science Driven: Agent Based Model, Group Model Building, Social Network Analysis
- Collecting data on
  - Diffusion of knowledge and engagement throughout committee and community networks
  - Development/diffusion of obesity prevention st
  - Social network structure and characteristics
  - Practice, policy, and environmental change



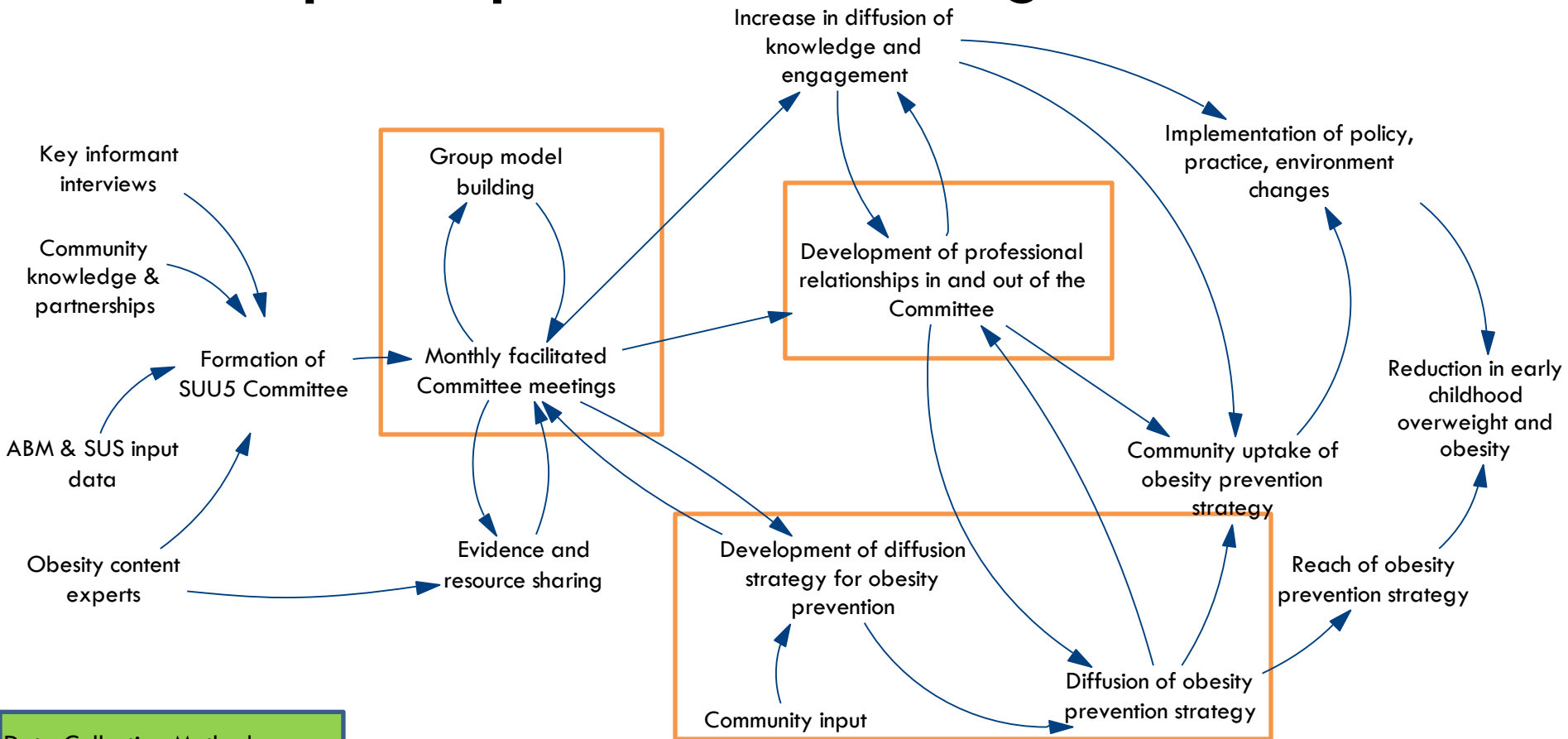
# Shape Up Under 5 Committee



- Multi-sector: representative of Somerville early childhood landscape
- Committee representation:
  - Medical practitioners
  - City government officials
  - Program directors (FNS, Farm to School, Somerville Early Education, WIC)
  - Childcare center directors
  - Directors of community-based organizations



# Shape Up Under 5 Logic Model



**Data Collection Methods**

**Legend:**

Indicates data collection tools informed by systems science

\* Indicates that survey is given to both SUU5 Committee and 1<sup>st</sup> degree alters ("Community")

Group Model Building output	Knowledge/ Transformative learning interviews	Measurement logs for diffusion strategy
Committee meeting notes	Focus group transcripts	Diffusion strategy adoption (Community survey and interviews)
COMPACT/KEN exit surveys	COMPACT/KEN survey*	Policy, practice, environment survey

# Group Model Building

- Participatory research method grounded in system dynamics
- Externalize mental models and develop visual representations of complex systems to better understand them
- Used to facilitate 7 of 15 meetings
- Can aid design and adaptation of intervention strategies that take into account the inherent complexities of implementation

December 2015

June 2017

Hopes and  
Fears

Connection  
Circles

Feasibility and  
Impact Grid

Structure  
Elicitation

Gallery Walk

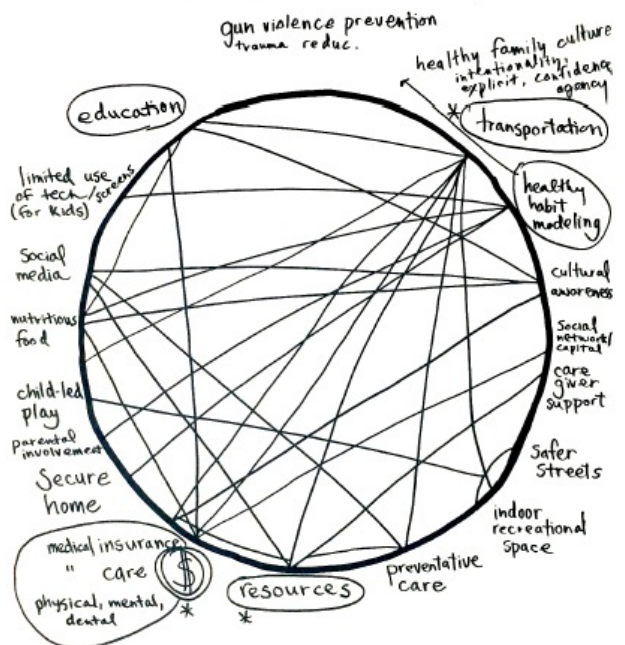
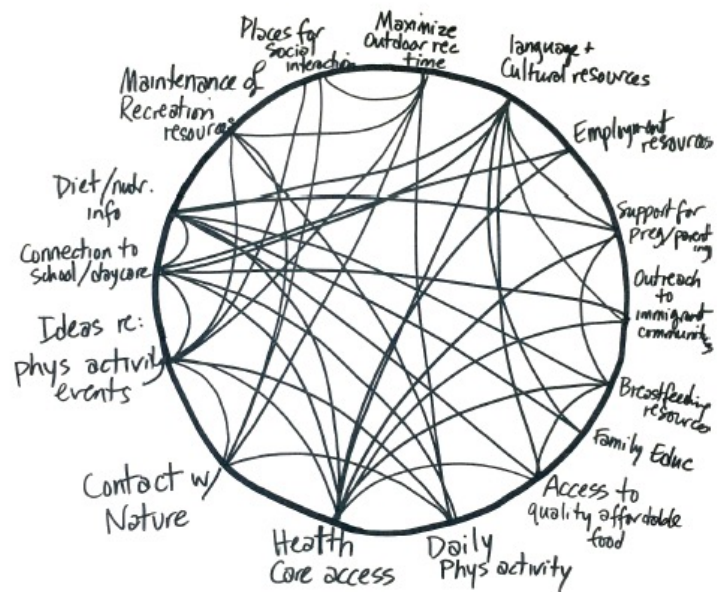
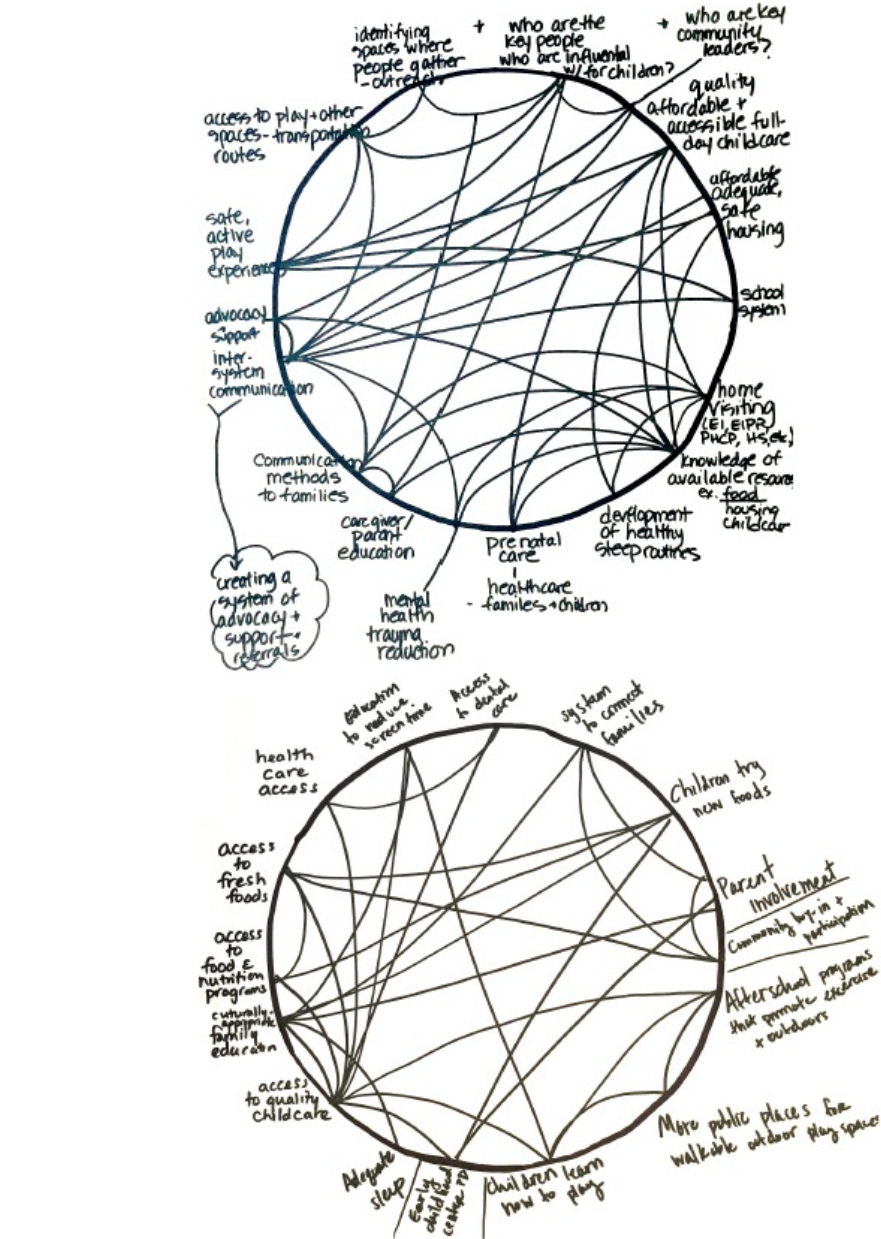
Causal Loop  
Diagram

Facilitators and  
Barriers

Meeting theme: Priority Sharing

Objective: To identify early childhood health priorities and connections between them

GMB activity: Connection Circles



## Targeted behaviors

# Map of a dynamic system of early childhood health in Somerville

## Community participation

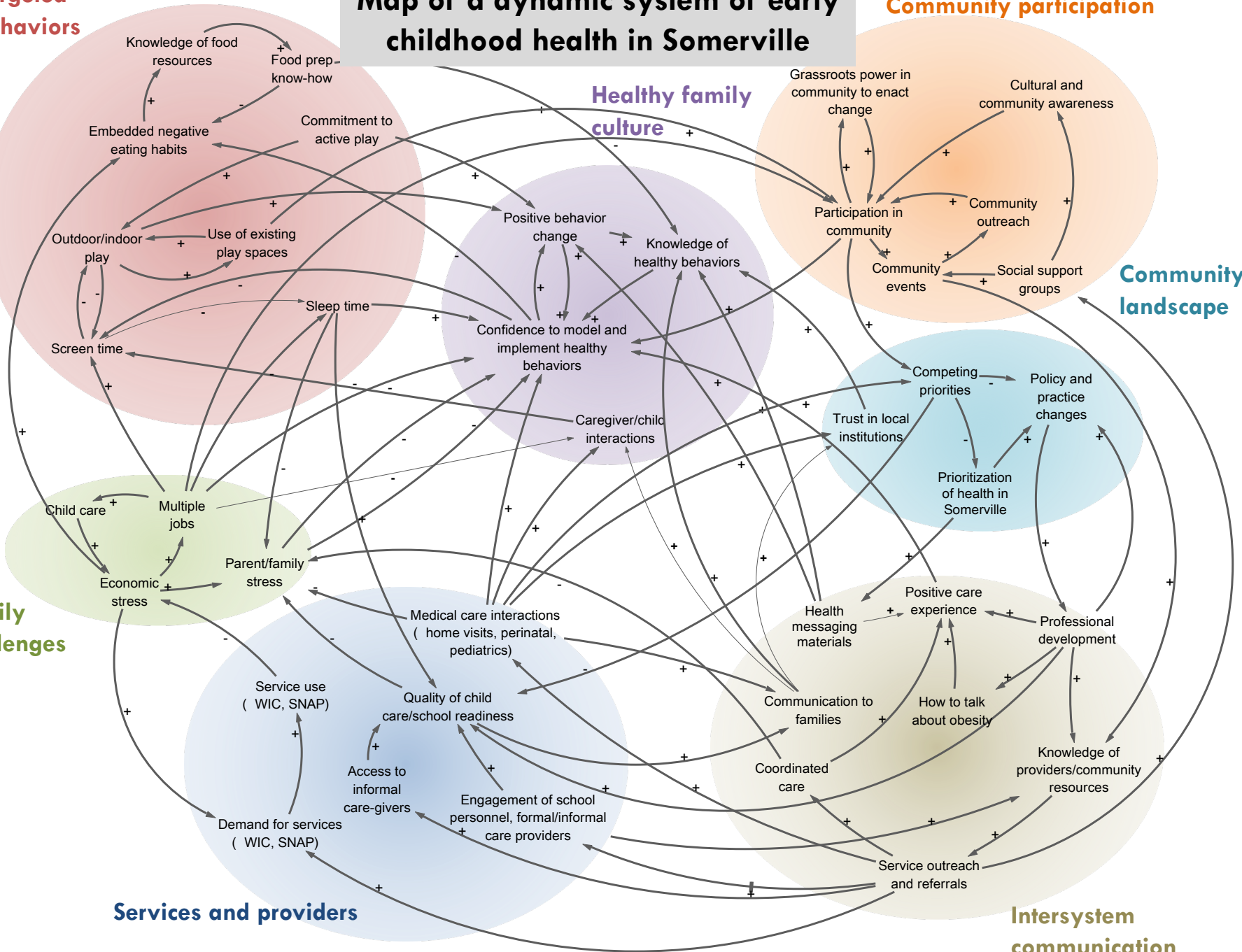
## Community landscape

## Family challenges

## Services and providers

## Intersystem communication

## Healthy family culture

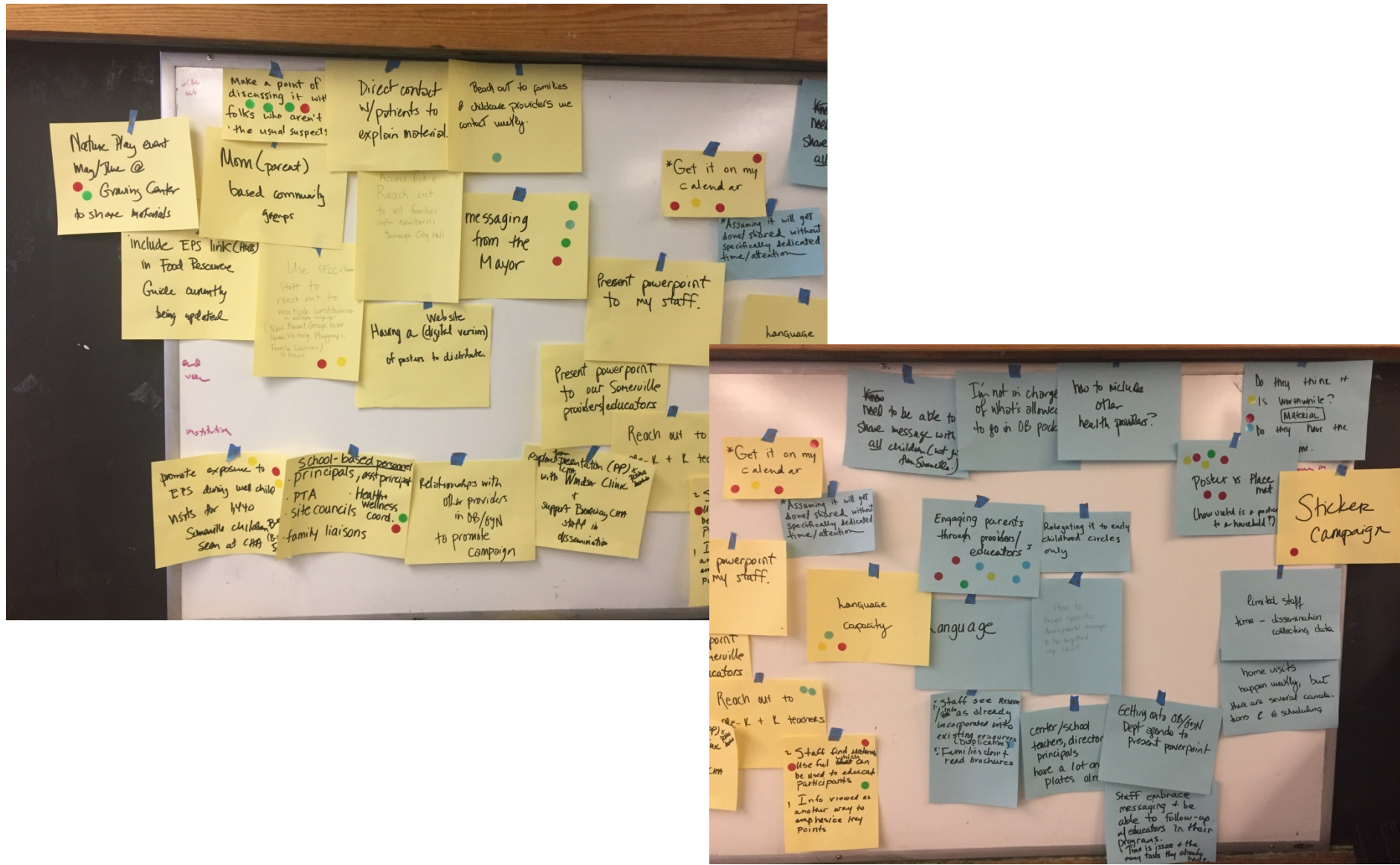




**Meeting theme:** Using the facilitators and breaking through the barriers

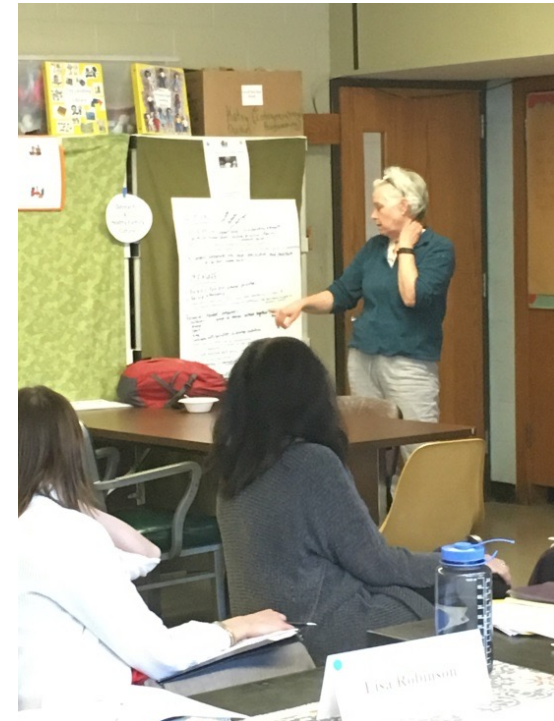
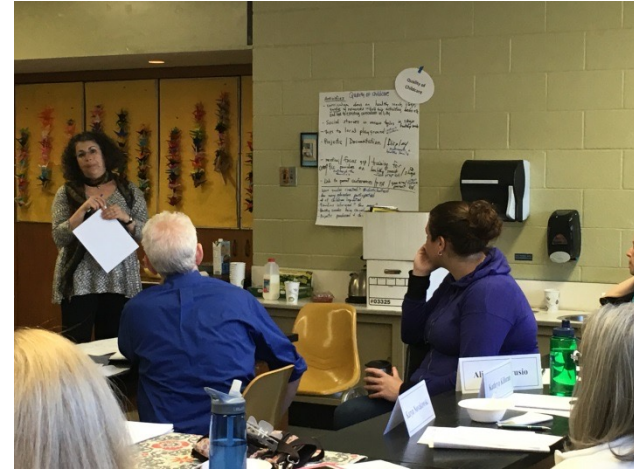
**Objective:** To identify barriers and facilitators to diffusing obesity prevention strategies for young children in Somerville

**GMB activity: Barriers and Facilitators**



# Committee Empowerment through GMB

1. Recognize hopes and fears of committee participation
2. Set priorities for intervening in community, and find common ground
3. Assess feasibility and impact of potential prevention activities
4. Map intra-system connections to understand system-wide impacts of work
5. Identify resources to support diffusion of materials





# Committee Process and Diffusion Strategies

- Unite health messaging for 0-5 in Somerville
- Research team provides nutrition evidence and helps identify key behavioral messages for children 0-5
- Iterative process within the Committee to refine diffusion materials
- Community input & focus groups to inform design



# Eat-Play-Sleep

1. Poster
2. Brochures
3. Somerville  
“Mayor’s Wellness  
Challenge”  
materials
4. Informational PowerPoint  
slide deck
5. Short instructional video
6. Talking points



WHAT ARE YOUR  
**Small Steps**  
TO HEALTHY BODIES  
HEALTHY MINDS?

DE UM PASSINHO  
ATUAIS TUAS

**Eat well.**  
HEALTHY HABITS.  
HEALTHY LIFE.

**Play together.**  
ACTIVE TIME.  
ACTIVE LEARNING.

**Sleep more.**  
RESTED MINDS.  
HAPPY FAMILY.

QUAIS SÃO SEUS  
**Pequenos Passos**  
EM BUSCA DE CORPOS SAUDÁVEIS  
E MENTES SAUDÁVEIS?

DE UM PASSINHO  
ATUAIS TUAS

**Alimente-se bem.**  
HÁBITOS SAUDÁVEIS.  
VIDA SAUDÁVEL.

**Brinquem juntos.**  
MOMENTOS ATIVOS.  
APRENDIZADO ATIVO.

**Durma mais.**  
MENTES DESCANSADAS.  
FAMÍLIA FELIZ.

¿CUÁLES SON SUS  
**Pequeños Pasos**  
PARA OBTENER CUERPOS SAUDABLES  
Y MENTES SAUDABLES?

DE A TU PASINHO  
UN PASINHO

**Alimentarse bien.**  
HÁBITOS SAUDABLES.  
VIDA SALUDABLE.

**Jugar juntos.**  
TIEMPO ACTIVO.  
APRENDIZAJE ACTIVO.

**Dormir más.**  
MENTES DESCANSADAS.  
FAMILIA FELIZ.

KI  
**Etap Ki Tou Piti**  
POU GEN KÕ KI ANSANTE?

DE A TU PASINHO  
UN PASINHO

**Manje byen.**  
ABITID ANSANTE.  
VIV ANSANTE.

**Jwe ansanm.**  
PASE TAN AP BOWE.  
APPANH AKTIVMAN.

**Dòmi plis.**  
REPOZE LESPRI A.  
FAMLI ÈPÈZ.



# WHAT ARE YOUR Small Steps TO HEALTHY BODIES HEALTHY MINDS?



## Screen time

Positive and friendly message about limiting screen time

## Eat well.

HEALTHY HABITS.  
HEALTHY LIFE.



## Play together

ACTIVE TIME.  
ACTIVE LEARNING.



## Sleep more.

RESTED MINDS.  
HAPPY FAMILY.



## Child feeding and nutrition

- Breastfeeding promotion for children of multiple ages
- Developmentally appropriate utensils, plates, cups
- Healthy beverage choices

## Physical activity

- Positive interaction between caregivers and children
- Structured and unstructured play and movement

## Sleep duration and quality

- Calming bedtime habits shown
- No screens and safe sleep surface depicted

# WHAT ARE YOUR Small Steps TO HEALTHY BODIES HEALTHY MINDS?



# Healthy Bodies Healthy Minds

9-5-2-1-0  
Is the Way  
to Go!

9 HOURS OF SLEEP	5 SERVINGS OF FRUITS AND VEGETABLES	2 HOURS OR LESS OF RECREATIONAL SCREEN TIME	1 HOUR OF PHYSICAL ACTIVITY	0 SUGARY BEVERAGES





# Eat-Play-Sleep Brochures

- Gives age-specific advice on how and why (0-9 months; 9 month – 3 years; 3-5 years)
- Translations: Spanish, Portuguese, Haitian Creole

**Small Steps to Healthy Bodies Healthy Minds**

**Birth to 9 months**

**Eat Well! Play Together Sleep More**

English 0-9 m.

**Eat Well**

**UNTIL 4-6 MONTHS**

Your baby only needs:

- Breastmilk + Vitamin D Supplement and/or
- Iron-fortified infant formula

**4-6 TO 9 MONTHS**

In addition to formula or breastmilk:

- Slowly start introducing your baby to pureed foods
- Explore a variety of foods, especially fruits and vegetables

**Your baby is sweet enough!**  
They don't need juice or other sugary drinks

**Play Together**

**UNTIL 6 MONTHS**

When your baby is ready:

- Tummy time under your watchful eyes helps them grow stronger
- Story time in your voice helps them learn

**AROUND 6 MONTHS**

Play time helps your baby learn!

- Create a space where your baby can play with you
- Take a break from the seat. Let your baby show you how they are ready to move

**Habits form quickly at this age!**  
Keep sleeping areas and play time free from screens

**UNTIL 6 WEEKS**

Sleep patterns may vary each day

**AROUND 6 WEEKS**

Sleep may happen more at night

**AROUND 3 MONTHS**

Sleep may happen mostly at night

**6 TO 9 MONTHS**

- Your baby needs 12-16 hours of sleep each day
- Start to use calming activities at bedtime

**Your baby sleeps safest on their back!**  
Place them on their back for all naps and at night time

**Sleep More**

**Recursos**

Somerville Hub  
somerville.org  
American Academy of Pediatrics  
healthychildren.org  
Womens, Infants, and Children (WIC)  
wic.gov/wic/women/infants-children/food/food-choices  
Centro de Chamadas N6 Emerg6ncias 311 de Somerville  
Ugu6 311

**DE UM MESADO A TRÊS ANOS**

**SHAPE UP UNDER 5**

Provetendo o crescimento saud6vel de todas as crianas em Somerville do nascimento aos 5 anos, com mensagens consistentes para cuidadores e fam6lias, por organizaes que apoiam o bem-estar de crianas pequenas.

Portuguese 9m.-3y.

**Alimente-se Bem**

**DE 9 MESES A 1 ANO**

Al6m do leite materno ou f6rmula, inclua alimentos s6lidos a cada dia

Introduza texturas novas:

- Alimentos tipo papinha
- Alimentos em pur6
- Alimentos mados cortados para comer com as m6es

Na hora da refei6o...

- Mantenha simples. Ofere6a escolhas da refei6o da fam6lia
- Inclua frutas, verduras e alimentos ricos em ferro (feij6o, ovos e carnes magras)
- Use leite integral at6 os 2 anos, depois mude para o leite com baixo teor de gordura

**DE 1 A 3 ANOS**

Seu beb6 e doce 6 suficiente!

Tente limitar o suco (m6ximo que 100%) a m6do x6cara por dia

**Brinquem Juntos**

**DE 9 MESES A 1 ANO**

- Brinque junto com seu filho e aprenda um com o outro
- Deixe seu filho se mexer fora do carrinho e da cadeira de alimenta6o

**DE 1 A 3 ANOS**

- Mantenha telas desligadas at6 os 2 anos, depois limite a m6do de 1 hora por dia
- Brinque tanto do lado de dentro

**Durma Mais**

**DE 9 MESES A 1 ANO**

- Seu filho precisa de 12-16 horas de sono por dia, incluindo sonecas
- Deixe seu beb6 de costas sempre que ele for dormir (p6neca ou a noite)
- As crianas devem com6ar aprender a dormir sozinho

**DE 1 A 3 ANOS**

- Seu filho precisa de 11-14 horas de sono por dia, incluindo sonecas
- A hora de dormir pode ser dif6cil. Deixe seu filho saber que voc6 est6 l6 e lembre a ele que 6 hora de dormir.

**6 mais seguro colocar seu beb6 para dormir de costas!**  
D6ne ele de costas na hora de soneca e 6 noite

**Ideas & Consejos para los 3 a 5 a6os**

**Comer Bien**

- Haga del tiempo de comida un tiempo en familia: apague todos los port6viles y tel6fonos juntos
- Hable con su proveedor de cuidados de salud, si tiene preocupaciones de los nutrientes o otros alimentos obligados

**Para controlar el tama6o de las porci6n:**

- Cuando sirva comida y bebidas utilice platos m6s peque6os, tazones, y tazas

**Para ayudar a su ni6o a beber bien:**

- Establecer puntos de tiempo en la pantalla para toda la comida
- Si usted sirve jugo, aseg6rese que este sea 100% jugo de 6ravel con sus car6niles en vez de entre los tiempos de comida
- Limite el jugo (solo 100%) a 1/2 taza cada d6a

**Jugar Juntos**

Limite los tiempos en la pantalla:

- Trate otros momentos para colorear a sus ni6os cuando ellos est6n en casa, como abricados o ley6ndoles un libro juntos
- Si elige tiempo en la pantalla, lim6telo a 1 hora, y vea su progreso que son favorables para su ni6o para ayudar a comprender lo que ve

**Motiv6 a jugar activos:**

- Plague del tiempo familiar un tiempo activo! Trate de ir a caminar o jugar juntos un juego al aire libre!
- Ofrezc6les juegos seguros o su ni6os como pelotas, bloques de colores
- Make sure all playtime is safe and supervised

**Dormir M6s**

Ayudar a su ni6o para aprender a dormir bien por si 6:

- Trate de no ir a su habitaci6n cada vez que lllore
- Si su ni6o tiene miedo de la oscuridad:
- Hablar con ellos acerca de sus temores
- Calent6 que sus temores son reales, y h6galos saber que est6 all6 para mantenerlos a salvo
- Give them a nightlight for their room

Spanish 3-5 y.

**COMIDAS PEQUE6AS PARA MANOS PEQUE6AS**

1 comida =

- 1 taza de leche con leche o queso
- 1 taza de fruta fresca
- 1 taza de verduras cocidas
- 1 taza de pan, pasta o arroz

**Comer Bien**

- Comience con el desayuno cada d6a
- 6codos inteligentes. Seleccionar frutas & verduras tan a menudo como usted pueda
- Coman la misma comida juntos como una familia tan a menudo como sea posible

**Jugar Juntos**

**Pr6ctique nuevos movimientos:**

- Saltando & p6ndose en un solo pie
- Subiendo & bajando escaleras
- Pateando & agarrando una pelota
- Brincando & nadando

**Haga tiempo para jugar durante el d6a.** Haga los tareas diarias, como comprar los comestibles, juegos activos y divertidos

**Limite el tiempo en la pantalla a 1 hora cada d6a** (TV, computadoras, tabletas, tel6fonos inteligentes, y v6deos [juegos])

**Sea un ejemplo a seguir,** apagando las pantallas cuando est6n juntos

**Los h6bitos se forman r6pidamente a esta edad!**  
Prop6ngale por lo menos 60 minutos de juegos activos cada d6a

**Prep6relo para ir a la cama:**

- Leyendo libros
- Cont6ndole cuentos
- Escuchando m6sica suave
- D6ndole una ba6a f6cil

Usando pantallas antes de ir a la cama puede ser dif6cil para calmarlos

**Dormir M6s**

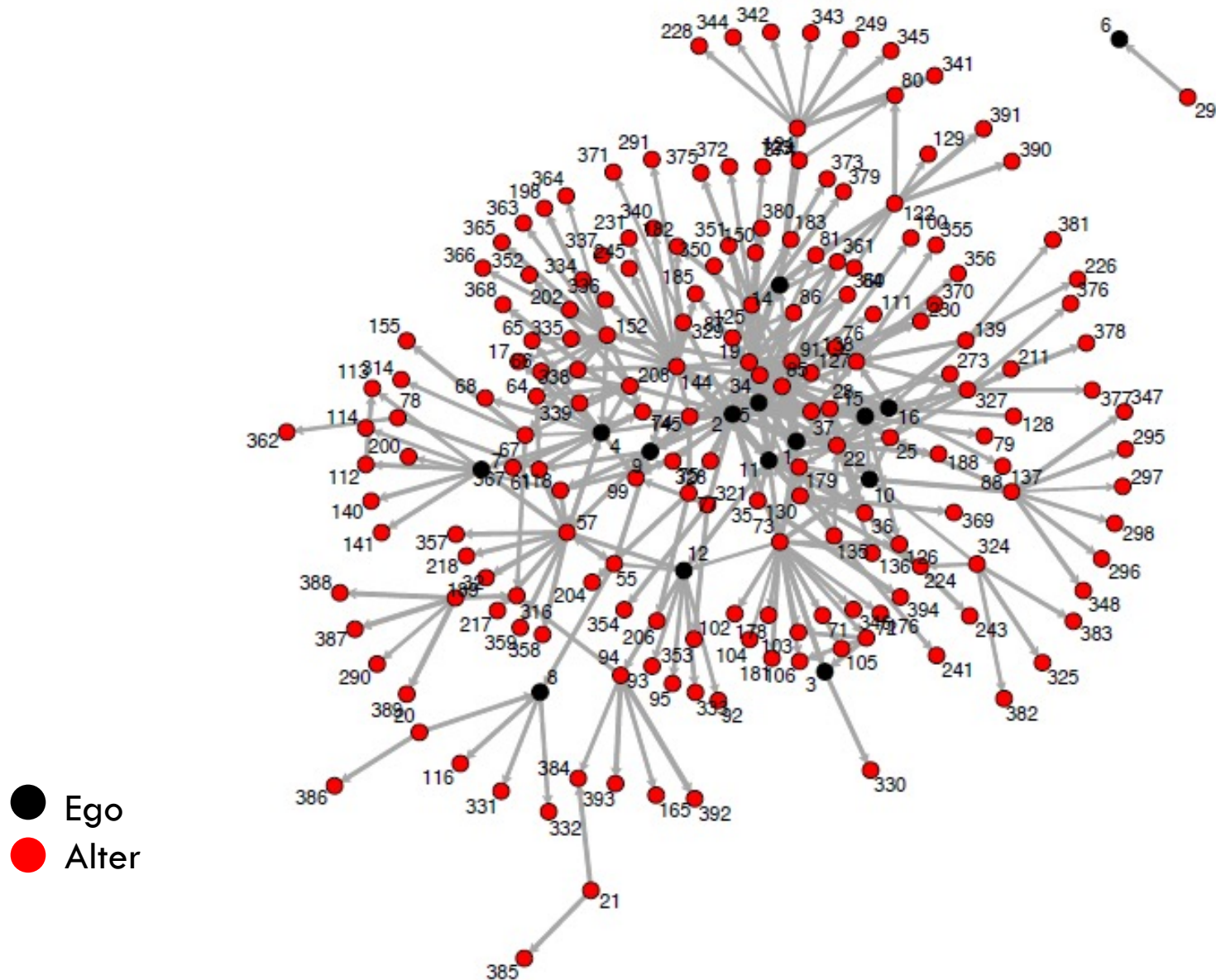
- Su ni6o necesita de 10-13 horas para dormir cada d6a, incluyendo la siesta
- Hacer las 6reas para dormir ligeramente fr6as, tranquilas y libres de pantallas

**6as rutinas son provechosas para su ni6o!**  
Haga una rutina para ir a dormir y despi6rtase los 7 d6as de la semana

# Using Social Networks for Diffusion of *Eat-Play-Sleep*

- Quarterly social network survey to assess:
  - Closeness
  - Influence
  - Frequency of interaction
- Network analysis can give information on best attributes for dissemination
- Including groups, we have over 400 unique IDs in the SUU5 Social Network

# Evolution of the Shape Up Under 5 Social Network





# Shape Up Under 5: key takeaways

- Facilitation tools (GMB) and intervention measurements (KEN survey) used in this pilot add rigor to measuring the work of community groups
- Upstream interventions, using intentional selection and facilitation methods, may have measurable and important midstream and down stream effects
- Increased knowledge and engagement of Committee members may be extended to Community members
- Replicability and cost-effectiveness can inform similar interventions, to bring this approach to scale nationally

# Questions?



# Thank You!

