Manga comic influences snack selection in Black and Hispanic New York City youth

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Childhood Obesity

- Childhood obesity is a global public health crisis
- Poor dietary behaviors
  - $>50\%$ US children do not meet recommended fruit consumption levels
  - Snacking accounts for $27\%$ of children’s daily caloric intake
- Previous interventions produced modest outcomes and limited reach
- Innovative and effective interventions needed to engage youth living in a multimedia environment
Narratives

• Health messages traditionally presented in didactic/expository forms
• Narratives emerging as promising tools for health-behavior change
  • Presents information in form of connected events, characters and consequences
  • Studied in health communication across television, movies, radio and testimonials
    • More recently, comic books
Manga

- Japanese comic art
  - Multimodal: images and text
  - Various age groups & nationalities, both genders
  - Various subject matter/genres

- Successful entertainment media
  - China: 10 of 11 best selling books, Thompson, 2007
  - US: $120 million in sales, Nielsen, 2010

- Strips (magazines/newspapers), paperback books or digital formats
Manga

- Used as education tool
  - Shakespeare
  - Statistics
  - Career Guide
  - History, culture and religion

**STORYLINE:**
One bizarre night
Johnny meets
Diana, the
unlikeliest career
advisor he’s ever
seen.

Part Cameron
Diaz, part
Barbara Eden,
she reveals
to Johnny the
six essential
lessons for
thriving in the
world of work.

**CUNY SCHOOL OF PUBLIC HEALTH**
What makes Manga comics unique to other comics?

• Differ from Western-style comic books in form and function  
  Kunai 2007
  • Drawing style
  • Transitions between comic panels
  • Unique pairing of detailed artwork with minimal, concise language  
  Schwatz 2009
Drawing style

• Masking
  • Characters drawn in simplified manner
  • Physical environment/background drawn in realistic detail

-Hayasi & Osima
<table>
<thead>
<tr>
<th>Transition Type</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moment to Moment</td>
<td>Single subject with slow progression</td>
</tr>
<tr>
<td>Action to Action</td>
<td>Single subject in distinct action to action progressions</td>
</tr>
<tr>
<td>Subject to Subject</td>
<td>Stays within a scene or idea, showing different parts of it, often in short chronological stages</td>
</tr>
<tr>
<td>Scene to Scene</td>
<td>Shifts reader across significant distances of time and space</td>
</tr>
<tr>
<td>Aspect to Aspect</td>
<td>Remains in same time frame, shows different aspects of a place, idea or mood</td>
</tr>
</tbody>
</table>
Manga Comics

- *Moment to Moment* and *Aspect to Aspect* transition types create sense of “being there”
- Establishes mood and tone of story
Manga Comics

• Drawing style and transition types promote greater audience participation
  • Increased imagery and use of senses
  • Readers more engaged with story’s messages
Manga Comics

• Could be unique and cost-effective platform to help promote healthy behaviors in youth

• Potential to reach broad audiences, including populations of difference gender, age, ethnicity, and literacy-level

• Understudied opportunity to reach youth
Theoretical Framework

Social Cognitive Theory (SCT)
- Observational learning
- Outcome expectations
- Self-efficacy
- Behavioral capability

Transportation-Imagery Model
Persuasion occurs because individual ‘transported’ into narrative world
How Does Transportation Lead to Belief Change? Green & Clark 2013

- **Identification with Characters**
  - Readers who relate to characters may be more likely to perform behaviors characters modeling

- **Lowering Resistance to Messages**
  - “Pleasure reading” may reduce motivation to counter-argue messages

- **Vivid Imagery & Minimal Text**
  - Graphic images compensate for lack of speech, elicit vivid mental images
Development of Manga Comic

• Theory-informed, evidence-based
  • Guided by formative research
    • *In-depth interviews and focus group discussions with intended population*

• Unique elements of Manga comics
  • Drawing style
  • Transition types
Manga Comic: Conceptual Model

**COMIC**
- Drawing Style/Graphics
- Transition Types
- Storyline
- Relatable Characters
- A Note from Kenzo

**Increased Immersion into Story (Transportation)**

**Observational Learning**

**Increased Fruit Intake**
- Increased Outcome Expectations
- Increased Self-efficacy
- Increased Knowledge

**Decreased Childhood Obesity Risk**
WHO'S WHO IN ZEN'A'KU

KENZO TACHIBANA
Seeming ly average 15 year old male. Liking soccer, attends Katakame High School, lives at home with his parents and sister Niki.
But Kenzo has a destiny.
His double in Mugen was a powerful warrior who is missing and presumed defeated and killed by Kamagoro. Now "Yokon Kenzo" will have to take up the battle to save both worlds.

BOKU
Mugen Kenzo's ammied taught him to fight Kamagoro, but they were defeated in that world.
Now Boku must find Yon Kenzo and bring out his inner warrior!

NIKI TACHIBANA
Kenzo's cute 13 year old, very chatty little sister.
Dad thinks she's more serious than he does! any age.

WHO'S WHO IN ZEN'A'KU

YUJI

JIMO
Jimo's time is spent thinking about how great he is and picking on anybody who might be smarter. Which, it turns out, is most people.
Somehow he has managed to date Hana, the cutest girl in school, much to Kenzo's disappointment and shame!

HANA
13 years old, female. The cutest pretty girl in school, she would never look twice at Kenzo, much less date him.

Fight for Your Right to Fruit©
Fight for Your Right to Fruit©
A Note from Kenzo

- One-page non-narrative included at end of comic
- A combination of narrative and non-narrative information may be necessary for a communication to be effective Slater 2002
Study Aim

• To determine if exposure to a Manga comic with messages promoting fruit intake influences snack selection in school-age youth.

• Hypothesis: Youth in the Comic group will more likely choose a healthy snack compared to youth in the Control group.

MM Leung et al. Manga comic influences fruit consumption in Black and Hispanic New York City youth (Journal of Nutrition Education and Behaviors, 2014)
Methods

• Two-group, randomized study
  • Brooklyn Community Services after-school programs
  • No exclusionary criteria

• Comic and Attention-control group
  • Comic group
    • Fight for Your Right to Fruit comic (30 pages)
  • Attention-control group
    • Newsletter (5 pages) and word search puzzle, both about Ancient Greece and Greek mythology
Brooklyn Community Services

- New York City-based non-profit community organization
- Two after-school program sites located in neighborhoods with a greater percentage of student eligible for free lunch
  - Crown Heights (79%)
  - East New York (96%)
  - Compared to citywide average (66%)
Data Collection

Day 1: Completed baseline questionnaires
Day 2: Selected snack
(4-6 days after day 1)
Primary outcome variable: *Snack Selection*

- Snack Selection
  - Separate room
  - One participant at a time
- Options
  - Healthy
    - 4 varieties of fruit (cut-up)
  - Unhealthy
    - 4 varieties (e.g., potato chips, cookies)
Secondary outcome variables: SCT constructs

- **Knowledge** (7 items)
  - Fruits have high amounts of vitamin C.

- **Self-Efficacy** (2 items)
  - It is difficult for me to eat fruit every day. (reverse-coded)
  - If I decide to eat fruit every day, I can do it.

- **Outcome Expectations** (2 items)
  - Eating fruit everyday makes me feel good.
  - Eating fruit everyday gives me more energy.

- Measured on Day 1 (baseline) and Day 2 (after reading)
  - 5-point response scale: Strongly Disagree (1) to Strongly Agree (5)
Secondary outcome variables: Transportation

- Measure degree to which participants were immersed in their media
- 12 item scale
  - Emotional Involvement
  - Cognitive Attention
  - Feeling of Suspense
  - Lack of Awareness of Surroundings
  - Mental Imagery
  - Imagery (related to the main character)
- Measured on Day 2 (after reading)
  - 5-point response scale: Not At All (1) to A Lot (5)
Data Analysis

- Multiple logistic and linear regression model used to assess between groups
  - Primary outcome (healthy vs unhealthy snack selection)
  - Transportation
- Paired t-tests
  - Assess within-group changes (pre- to post-test) in SCT constructs
- Significance level < .05
## Participant Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Comic</th>
<th>Attention-control</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>31</td>
<td>28</td>
</tr>
<tr>
<td>Age, y (mean ± SD)</td>
<td>11.1 ± 1.7</td>
<td>10.5 ± 1.3</td>
</tr>
<tr>
<td>Sex (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>55</td>
<td>54</td>
</tr>
<tr>
<td>Race (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black/African American</td>
<td>78</td>
<td>70</td>
</tr>
<tr>
<td>White</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>Hispanic/Latino</td>
<td>19</td>
<td>15</td>
</tr>
<tr>
<td>Other/mixed</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>Grade (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 and 5</td>
<td>48</td>
<td>65</td>
</tr>
<tr>
<td>6-8</td>
<td>42</td>
<td>23</td>
</tr>
<tr>
<td>Ungraded</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>Fruit and Vegetable Intake (%) a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>74</td>
<td>54</td>
</tr>
<tr>
<td>Physical Activity (%) b</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>57</td>
<td>62</td>
</tr>
<tr>
<td>Manga reader (%) c</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>26</td>
<td>15</td>
</tr>
</tbody>
</table>

Data at baseline

a F/V Intake defined as consuming fruit/vegetables 5 or more times/day in past 7 days
b PA defined as doing 60 minutes/day of physical activity on 5 or more days in past 7 days
c Manga reader defined as having ever read or looked at a Manga comic.
Percent snack selection, by group

* P = .04, Odds Ratio [OR] = 3.63, 95% Confidence Interval: 1.09-12.1

Comic group 3.6 times more likely to choose a healthy snack compared to Attention-control group.
### Primary and secondary outcomes

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Comic</th>
<th>Attention-control</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Snack selection, n (%)</strong>&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Healthy</td>
<td>21 (61)</td>
<td>9 (35)</td>
</tr>
<tr>
<td>Unhealthy</td>
<td>9 (39)</td>
<td>17 (65)</td>
</tr>
<tr>
<td><strong>Knowledge</strong></td>
<td>0.24 ± 0.65</td>
<td>0.20 ± 0.69</td>
</tr>
<tr>
<td><strong>Self-Efficacy</strong></td>
<td>0.38 ± 0.92&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0.06 ± 0.96</td>
</tr>
<tr>
<td><strong>Outcome Expectations</strong></td>
<td>0.02 ± 0.85</td>
<td>0.04 ± 0.79</td>
</tr>
<tr>
<td><strong>Transportation</strong></td>
<td>3.36 ± 0.1</td>
<td>2.79 ± 0.1</td>
</tr>
</tbody>
</table>

<sup>a</sup>P = .04;  <sup>b</sup>P = .04;  <sup>c</sup>P = .006
Change in psycho-social variables, by group

![Bar chart showing changes in knowledge, self-efficacy, and outcome expectations.](chart)

* p-value = 0.04
Discussion

• First study to evaluate behavioral impact of a Manga comic with health messages

• Manga comic may have influenced snack selection, as Comic group was more likely to choose a healthy snack, compared to Attention-control group
  • Similar findings evident in previous studies Baranowski et al. 2011, Branscum et al. 2013,
  • However, previous results were self-reported, whereas current study used direct observation
Limitations

• Comic included both implicit and explicit information
  • “A Note from Kenzo” was included at end of comic

• Lack of additional comparison group (health-related newsletter)
  • Attention-control group read a newsletter about Ancient Greece and Greek mythology

• Limited items included in psychosocial scales
  • Only 2 items were used to measure self-efficacy and outcome expectations
Limitations

• Small sample size (n=59)
• Outcomes measured immediately after media exposure
  • Not possible to measure long-term dietary outcomes due to single-session design
• Generalizability (conducted in 2 New York City neighborhoods)
  • However, study population representative of youth at risk for childhood obesity
Public Health Implications

- Manga comics popular reading trend for youth internationally
- Diversity of participants highlights potential to be used with various populations
- Format easily disseminated
  - Print/Internet
  - Increases potential for reach
Public Health Implications

• Graphics and minimal text promising format for low-literacy populations

• Part of comprehensive program to create awareness and opportunities to promote positive messages
Questions or Comments?

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