FIGHT FOR YOUR RIGHT TO FRUIT©: DEVELOPMENT AND TESTING OF A MANGA COMIC PROMOTING FRUIT INTAKE IN MIDDLE-SCHOOL YOUTH

May May Leung

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Approved by:

Advisor: Alice S. Ammerman

Reader: Marci K. Campbell

Reader: Deborah F. Tate

Reader: Jane D. Brown

Reader: Jianwen Cai

Reader: Melanie C. Green

ABSTRACT

MAY MAY LEUNG: *Fight for Your Right to Fruit*©: Development and testing of a Manga comic promoting fruit intake in middle-school youth
(Under the direction of Alice S. Ammerman)

Innovative interventions addressing childhood obesity are needed to capture the attention of youth living in a multi-media environment. Manga comics (Japanese comic art) may be a novel platform to promote positive health behaviors in youth. The purpose of this study was to develop a Manga comic promoting fruit intake and evaluate its impact on related psycho-social variables in middle-school youth. This dissertation followed three aims. Aim 1 consisted of a content analysis of nutrition and physical activity (PA)-related behaviors in four *Shonen* (Boys) and four *Shojo* (Girls) Manga comics. Most common positive health behaviors represented were fruit/vegetable consumption, family meals and moderate/vigorous PA, while large portion sizes, intake of high energy-dense foods and television/other screen time usage were the most frequent negative health behaviors depicted. In Aim 2, seven focus groups and two interviews (N=28) were conducted with youth to better understand such topics as enjoyable components of Manga comics and important health concepts. Most frequently mentioned themes related to enjoyable Manga comic components were detailed graphics and artistic style of text used to convey sound effects. Majority said eating fruits/vegetables was the most important nutrition behavior for proper health. Aim 3 consisted of a three-group, randomized single-session study with middle-school students. Participants (n=263) were randomly assigned to receive a Manga comic about fruit (Comic group), a newsletter about fruit

(Newsletter group), or a newsletter about ancient Greece (Control group). Psycho-social variables related to fruit consumption were measured at baseline and immediately after reading. Post-intervention focus groups were conducted to evaluate acceptability and comprehension of the comic. Outcome expectations tended to be different in Comic group compared to Control group ($p=0.03$), while Comic group reported greater transportation ($p<0.01$), enjoyment ($p<0.05$) and engagement ($p=0.00$) than Newsletter and Control groups. Focus group data show majority of Comic group participants enjoyed the graphics and storyline, understood the main message and felt like eating more fruit. Results are promising and suggest that Manga comics may create an entertaining and informative learning environment that has potential to help promote behavior change in youth. Further research should be conducted to explore its impact on health behaviors.

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INTRODUCTION

I.A. Overview

Childhood obesity is a serious public health crisis in the United States-the rate has tripled within the last 30 years. Its prevalence has profound psycho-social, physical and economic consequences. Numerous interventions have been designed to promote healthy behaviors to prevent childhood obesity, however, most interventions have been too costly to maintain or resulted in modest positive outcomes and limited reach.

Innovative interventions are needed to capture the attention of youth living in a multi-media environment. Narrative approaches are emerging as a promising set of tools for motivating and supporting health-behavior change, particularly ones that evoke vivid imagery. It is believed that the persuasion to change health-related behaviors occurs because an individual is 'transported' into the narrative world, and thus more likely to believe the story propositions.

Manga, Japanese comic art, have become successful entertainment media in many countries, including the US. Because of its popularity, Manga have been used as a medium to educate people on history, culture, religion and career advice, across the continents. Furthermore, Manga comics are unique in that they convey stories in such a way that a reader is likely to become 'transported' into a story.

To date, Manga comics have not been used as health promotion vehicles, however, could be a unique platform to promote healthy behaviors in youth. Manga

comics present a largely untapped mechanism and opportunity to reach youth living in a multi-media world.

The purpose of this research is to develop and evaluate a Manga comic with embedded messages promoting fruit intake on related psycho-social variables in middle-school youth.

I.B. Specific Aims

Phase 1: Conduct formative research to understand health-related concepts for youth Manga comics.

Aim 1: Conduct a content analysis on nutrition and physical activity (PA) content in popular Manga comics in the US for middle-school youth.

1a. Identify the nutrition and PA-related messages that are being conveyed.

1b. Identify the demographics of the characters, who are modeling the nutrition and PA-related behaviors.

Aim 2: Conduct focus groups with middle-school youth to determine what concepts should be included in a *Healthy Manga* comic.

2a. Identify Manga storylines and characters which youth prefer.

2b. Identify core components of Manga comics that make it enjoyable for youth.

2c. Determine which health messages youth would like to be included in a *Healthy Manga* comic.

Phase 2: Use the formative data to develop the *Healthy Manga* comic, then evaluate its impact on psychosocial variables related to the targeted nutrition behavior.

Aim 3: Test the efficacy of the *Healthy Manga* comic.

3a. Using a three-group study design, determine if exposure to the *Healthy Manga* comic influences outcome expectations, self-efficacy and knowledge related to fruit intake.

3b. Conduct post-intervention focus groups to evaluate the acceptability, comprehension, and perceived impact of the *Healthy Manga* comic.

CHAPTER II

LITERATURE REVIEW

II.A. Significance

Childhood obesity continues to be a serious public health issue in the US. Over the last three decades, the rate of childhood obesity has tripled. More than one-third of 6 to 19 year olds are considered overweight or obese, while children ages 6 to 11 years have the highest prevalence at 37.2% (Ogden et al., 2006). Mexican American youth have the highest rate of obesity compared to whites and blacks, however, trends in obesity have increased across all ethnicities, including Native Americans and Asian Americans (Gordon-Larsen, Adair, & Popkin, 2003; Ogden et al., 2006; Zephier, Himes, Story, & Zhou, 2006).

Obesity has extensive economic, physical and psychosocial consequences, including long-term consequences leading into adulthood (Daniels, 2006; Guo, Chumlea, Roche, & Siervogel, 1998; Guo & Chumlea, 1999; Rolland-Cachera, Bellisle, & Sempe, 1989; Trasande, Liu, Fryer, & Weitzman, 2009; Whitaker, Wright, Pepe, Seidel, & Dietz, 1997). Direct economic costs of childhood obesity are estimated at $14.1 billion, while indirect costs, such as job absenteeism is an estimated $4.3 billion (Cawley, 2010). One of the physical consequences of obesity that is becoming a greater concern in children is the Metabolic Syndrome, which is a grouping of clinical characteristics, such as insulin resistance, abdominal obesity, abnormal glucose tolerance, elevated blood pressure, elevated triglycerides and reduced HDL (Saland, 2007). Metabolic Syndrome is a serious

health concern as it is associated with the development of chronic diseases, such as cardiovascular disease and type 2 diabetes (Saland, 2007). In addition, social consequences can include stigma, negative stereotyping, social discrimination, teasing and bullying. These factors can result in psychological stresses such as low self-esteem, negative body image and depression, which can affect academic and social functioning, and persist into adulthood (Daniels, 2006).

II.B. Contributing factors of Childhood Obesity

Energy Intake.

Childhood obesity is a complex epidemic with multiple contributing factors. Poor eating habits, including inadequate intake of fruits and vegetables and increased intake of sugar-sweetened beverages and high energy-dense foods, have all been associated with this serious public health problem (Field, 2008; James, Thomas, Cavan, & Kerr, 2004; Johnson, Mander, Jones, Emmett, & Jebb, 2008; Ludwig, Peterson, & Gortmaker, 2001). A longitudinal study that followed children aged 9 to 14 years for four years found that consumption of sugar-sweetened beverages implied small increases in body mass index (BMI), for both boys and girls (Berkey, Rockett, Field, Gillman, & Colditz, 2004). Recent research has found that dietary snacking behaviors in youth have become more frequent between 1989 and 2004 (Piernas & Popkin, 2010). Piernas and Popkin (2010) observed that US children's snacking trends are shifting towards three snacks per day, while greater than 27% of children's daily calories are coming from snack intake with desserts and sugar-sweetened beverages as the major sources of calories from snacks. Dietary behaviors that have been suggested to decrease the risk of childhood obesity are

eating fruits and vegetables, eating breakfast daily, having family meals and limiting portion sizes (Barlow & Expert Committee, 2007).

Energy Expenditure.

Physical inactivity is clearly associated with an increase in obesity and related morbidity among youth (Daniels, 2006). It is recommended that children receive at least 60 minutes per day of moderate to vigorous physical activity (MVPA), however, many youth do not come close to meeting such recommendations (Nader, Bradley, Houts, McRitchie, & O'Brien, 2008). Gender and age appear to be the most important determinants of MVPA. Nader and colleagues (2008) found that most children at 9 years of age exceeded the recommended 60 minutes per day. By age 15 years, only 31% met the guidelines. Girls were consistently less active than boys across the ages. This lack of physical activity may be a result of increase television or other media use. Gortmaker (1996) reported a dose-response relationship between TV time and obesity; children who watched more than five hours of television per day had a much greater chance of being obese than kids who watched zero to two hours per day (Gortmaker et al., 1996). Although there isn't a clear understanding of the association between television or other media use and weight, it is believed that numerous factors play a role. In addition to media use possibly displacing physical activity, food advertisements on television or internet may increase the child's desire for, and ultimately, consumption of energy-dense snacks. Third, snacking behavior is associated with television watching, which could result in greater consumption of calories.

The highlighted contributing factors have been addressed in many childhood obesity prevention programs, conducted in a variety of settings such as the school, home

and community (Doak, Visscher, Renders, & Seidell, 2006). However, regardless of setting or targeted behavior, most interventions have been too costly to maintain and/or resulted in modest positive outcomes and limited reach (Thomas, 2006).

II.C. Narrative Communication

Innovative methods and interventions are needed to capture the attention of youth who are living in a world stimulated by video games, computers and television programs. Interventions that incorporate narratives may engage today's younger population. Narratives, which have been used to change beliefs and inspire action, are now emerging as promising tools to support health-behavior change (Green, 2006; Hinyard & Kreuter, 2007). Health communication has predominantly used fact-based evidence and appeals to logic and reason to persuade and motivate people to adopt behavior change. Researchers and practitioners are turning to narrative forms of communication, such as education entertainment and storytelling, to achieve the same objective. Although there is no one definition of *narrative communication*, it can be defined as "any cohesive and coherent story with an identifiable beginning, middle and end that provides information about scene, characters, and conflict; raises unanswered questions or unresolved conflict; and provides resolution" (Hinyard & Kreuter, 2007).

II.D. Narrative versus Fact-based communications

There have been numerous studies examining the impact of narrative versus fact-based evidence on persuasion. While narrative communication often refers to a case story or an example of a single person/character, fact-based communication tends to be a quantitative summary of a large number of cases, such as providing percentages to convey information. A review by Baesler (1994) examined 19 studies comparing

narrative and fact-based evidence and found that the majority of studies reported narrative evidence as being more persuasive (Baesler & Burgoon, 1994). On the other hand, a meta-analyses of 16 studies concluded that fact-based information was more persuasive (Allen & Preiss, 1997). Findings have been inconsistent, partly due to the varying definitions of a narrative and the methods and measures used for evaluation.

A study by Quintiliani and Carbone (2005) found that change in self-efficacy for fat, fruit and vegetable intake was higher in participants who preferred and received narratives compared to those who preferred and received fact-based information, related to cancer prevention messages. However, both groups expressed the desire for more fact-based information. Slater and Rouner (1996) suggest that narratives may be effective at overcoming resistance as narrative evidence has been shown to be more effective than fact-based evidence, particularly when messages are not similar to one's own beliefs. For example, they found that alcohol-education messages based on anecdotal evidence were considered more persuasive and believable than those based on statistical evidence among college students whose values differed to the educational messages (Slater & Rouner, 1996). A later study by Slater et al. (2003) explored the effects of different types of narrative evidence (conversational and testimonial) versus didactic evidence (news article format) in providing nutrition information. Results showed that while all forms of evidence were equal on ratings of clarity, perceived usefulness and self-efficacy, the conversational form of the narrative evidence was more believable than the other types.

Limited research has been conducted on whether a combination of narrative and fact-based evidence would be more effective than either evidence alone. However, entertainment-education research suggests a combination, such as a non-narrative

summary recapping the intended persuasive message of a narrative piece, may be necessary for a communication to be successful (Slater & Rouner, 2002). Campbell and colleagues have developed health communications combining both narrative and fact-based information (Campbell, Honess-Morreale, Farrell, Carbone, & Brasure, 1999; Campbell et al., 2004). These health communications targeting low-income women, included a soap opera, 'info-mercials' and tailored dietary feedback. One study found that the combined health communication resulted in significant increases in knowledge of low-fat foods, self-efficacy in eating healthier foods and stages of change, while some dietary behavior change was observed in the intervention group compared to the control group (Campbell et al., 1999). In another study with a comparable health communication piece, Campbell et al. (2004) observed similar results with improved knowledge and self-efficacy, however dietary changes were not found. These results do suggest that a combined health communication may be more effective than one form of evidence, in impacting health belief and behavior change.

II.E. Manga Comics

Manga comics, which are Japanese comic art, may be a novel platform to promote positive health behaviors in youth. They are a unique form of multimodal narrative media that combine detailed visual images and text. Over the decades, Manga comics have expanded their reach and are now aimed at all ages, from elementary school children to adults. Subject matter of Manga comics ranges from action/adventure stories to romance, mystery, and science fiction/fantasy; essentially any genre that exists in popular books is available in Manga form (Thompson, 2007).

Although Manga originated in Japan, their popularity has spread to other countries. In China, 10 out of the 11 best selling books in 2006 were Manga (Thompson, 2007). Enthusiasm for Manga has also been adopted by Western countries. In the US, sales in 2009 topped over $96 million (The Nielsen Company, 2010). Because of their popularity, Manga have been used as a form of education-entertainment for topics, such as history, culture, religion and career advice, around the world (Berfield, 2008; Hodder & Stoughton, 2007; Kaplan, 2007). The Chinese government sponsored a 74-volume Manga version of its traditional literary masterpieces, in an attempt to educate the population about its extensive history, while in the UK, a Manga-version of *The Bible* has been published (Hodder & Stoughton, 2007). In the US, Kaplan Publishing released a SAT/ACT vocabulary-building Manga series for teens and a *New York* Times bestselling author created a business career guide in Manga format, which stars Johnny Bunko, an office worker who despises his job, but encounters a Chopstick Genie who guides him into a more successful career (Berfield, 2008; Kaplan, 2007). However to date, Manga comics have not been used for health behavior change interventions.

Manga comics are unique in several ways, which may explain their cross-cultural popularity. One unique aspect is its drawing style-the images and perspectives of the characters are drawn in such a way to evoke vivid imagery and in essence, to 'transport' the reader into the story. For example, Manga comics often use a technique called 'masking' (McCloud, 1994). With this technique, characters are drawn in a simplified manner so essential physical features are maintained, therefore, more people are likely to identify with that character, which creates a greater level of audience involvement. A study conducted by Lu (2009) found that the majority of participants often projected their

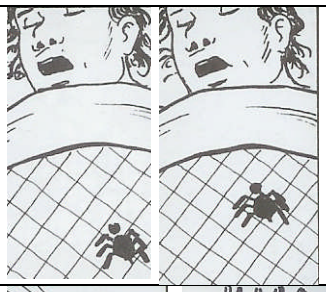
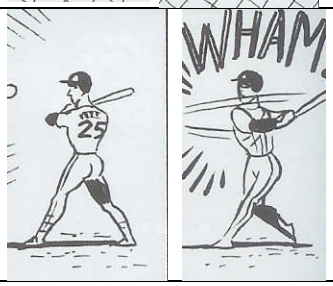
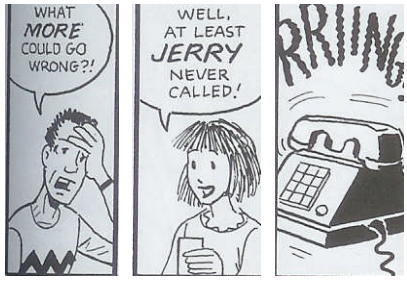
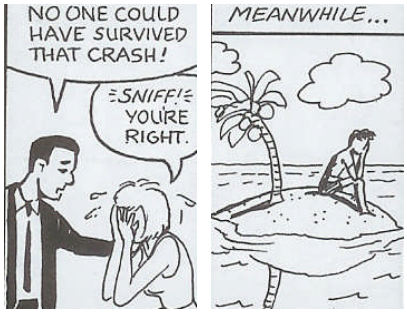
own race onto a sample of 341 comic characters they were shown, although most of the characters were originally intended to be Asian. While the character's physical features may be 'masked', psychological and emotional states of the character are clearly expressed, if not exaggerated (Ito, 2005). Meanwhile, the physical environment or background is drawn in greater realistic detail, which allows the reader to "mask" him/herself in a character and enter into a vivid and stimulating world. Furthermore, specific objects, such as a sword related to the storyline may be emphasized, not only displaying its details, but making the reader aware of its weight, texture and physical complexity, thus creating greater stimulation (McCloud, 1994).

Audience participation is key to the success of comics. Comic panels break both time and space, presenting "a jagged staccato rhythm of unconnected moments" (McCloud, 1994). The reader must be a willing and conscious participant to 'close' the unconnected moments. This type of participation does happen in film, however it occurs much more frequently in comics. Participation is quite powerful as it allows the reader to use his/her imagination, thus perhaps becoming more immersed into a story.

Another aspect that makes Manga comics unique is how they transition from frame to frame within a comic story. There are five common transition types in comics. Table 2.1 explains each of the transitions. Comics do have patterns in the types of transitions that are used and how frequent each transition is used. **Action**, **Subject** and **Scene** transitions show events of a story happening in concise and efficient ways, which is commonly used in Western comics. In Manga comics, **Moment** and **Aspect** transition types are also used. Manga comic books tend to be longer than typical comics as **Moment** transitions often take more space to convey a point. However, this emphasizes

"being there" as opposed to "getting there", which creates a unique perspective and vision. The **Aspect** transition can create an even deeper sense of "being there". The **Aspect** example in Table 2.1 shows four frames of a comic in a single kitchen scene. It is clear that the woman is in a kitchen, but as the reader connects the panels together, he/she may begin to use other senses. The reader is more likely to smell, hear, feel and taste what is going on in the kitchen. The text also may help to create the stimulation of those senses and increase perceptions of the scene. The unique style and technique of Manga comics tend to promote greater audience participation leading to increased imagery and use of other senses. These comics tend to focus on establishing a mood or a sense of place. Thus, readers of Manga comics may become immersed into a story and possibly be more persuaded by the messages within.

Table 2.1. Comic panel transition types (McCloud, 1994)

Transition Type	**Definition**	**Example**
Moment to Moment	A single subject with slow progression	
Action to Action	A single subject in distinct action to action progressions	
Subject to Subject	Stays within a scene or idea, showing different parts of it, often in short chronological stages	
Scene to Scene	Shifts the reader across significant distances of time and space; deductive reasoning is often required for transition type	
Aspect to Aspect	Remains in same time frame, shows different aspects of a place, idea or mood	

CHAPTER III

THEORETICAL FRAMEWORK

III.A. Transportation-Imagery Model

The Transportation-Imagery model (TIM) (Figure 3.1) posits that narrative persuasion occurs because an individual is 'transported' into the narrative world (Green & Brock, 2002). Transportation is defined as "an integrative melding of attention, imagery and feelings focused on story events" (Green, Garst, & Brock, 2004). TIM applies specifically to narratives, particularly ones that evoke vivid imagery, as opposed to "didactic rhetoric" (Green & Brock, 2000; Green & Brock, 2002).

Transportation into a narrative world is believed to lead to acceptance of persuasive messages within a story through multiple mechanisms (Green & Brock, 2002; Green et al., 2004). The first mechanism is the relationship with characters. If a reader likes or identifies with a specific character, the events experienced or statements made by the character may have a greater effect in shifting the reader's beliefs (Green, 2006).

The characters may serve as role models for appropriate behaviors. Furthermore, characters in a narrative may shift beliefs in perceived norms. For example, if a well-liked television character mentions a preference for healthy foods, viewers may begin to have a positive association towards the food. Characters also help create emotional responses to narratives. Emotion, which appears to be related to attitude change, is also a major component of narrative impact (Oatley, 2002). Therefore, narratives which create emotional responses may be effective in changing attitudes and behavior. While the TIM

asserts that identification with the character likely facilitates both transportation and modeling, it is possible that identification may occur separately from transportation.

Identification can be conceptualized as "an audience member imagines him/herself being that character and replaces his/her personal identity and role as audience member with the identity and role of the character within the text" (Cohen, 2001). This imagination process has both affective and cognitive dimensions. Empathy, which is characterized by one's ability to share a character's emotions, is the most common form of affective identification, while cognitive identification is related to the reader/viewer's understanding of a character's goals and motives and developing an ability to understand the narrative's events from the character's perspective (Cohen, 2001).

Transportation may also elicit belief changes by lowering resistance to the messages in the narrative. Resistance, defined as a reaction against change or a motivation to oppose persuasive appeals, is a key barrier to changing attitudes and behaviors (Knowles & Linn, 2004). Narratives may be particularly effective at overcoming resistance as narrative evidence has been shown to be more effective than fact-based evidence, particularly when messages are not similar to one's own beliefs, as mentioned in the previous chapter. In addition, individuals seek entertainment products to meet personal needs, therefore, presenting narratives as entertainment, instead of education, may further enhance the transportation effect. Transportation into the narrative world is likely to lead to greater persuasion and a decrease in negative thoughts or resistance to the story's messages.

A third potential mechanism of transportation is coherence, in which a story is logical and consistent. Researchers are learning that readers have different expectations of a narrative depending on its storyline or genre (M. C. Green, personal communication, August 2008). While a biography may be expected to describe realistic events, a science fiction narrative may be expected to have more fantastic events. Thus, a consistent and logical story that meets the expectations of a reader may result in more positive responses to the story's messages.

Images have also been frequently used in health communication. TIM suggests that these images are most impactful when they are embedded in a story, rather than provided in isolation (Green & Brock, 2002), thus visual images relevant to the story's messages, such as those incorporated in Manga comics, may further impact attitudes and beliefs.

The three possible mechanisms of transportation combine to facilitate mental stimulation of new situations (Oatley, 2002). This mental stimulation can serve as a form of "behavioral rehearsal", which may help change beliefs and behaviors (Gregory, Cialdini, & Carpenter, 1982). If individuals can imagine themselves going out for a walk everyday, they may feel more confident in their ability to do so in real life.

The act of being 'transported' is influenced by multiple factors, which include the quality and format of the narrative, use of suspense, imagery in the narrative, coherence of the narrative, ability of readers to create vivid images in their minds and propensity for absorption (Green, Garst, & Brock, 2004; Schank & Berman, 2002). Both factual and fictional narratives have been shown to change beliefs and transportation is proposed as the mechanism by which persuasion takes place (Green & Brock, 2002; Green et al.,

2004; Strange & Leung, 1999). Green and Brock (2000) found that individuals, who were more transported into the story, reported more story-consistent beliefs, regardless of the factual status of the narrative they read. Although transportation research has mainly evaluated narratives in written form, the model suggests that transportation can occur for "any recipient of narrative information" and can be experienced by those who listen or view narratives (Green & Brock, 2000; Green & Brock, 2002; Green et al., 2004).

III.B. Social Cognitive Theory

Social cognitive theory (SCT), which has informed the design of many behavioral interventions, highlights another mechanism through which narratives that include characters to whom readers can relate, like Manga comics, could influence health-behavior change. By observing a role model (observational learning), individuals can learn a behavior and will be more likely to perform it, if they see the model rewarded for the behaviors in ways that they value (Baranowski, Perry, & Parcel, 2002). The development of entertainment-education narratives draws greatly on SCT by using role models to perform new behaviors, which aim to improve outcome expectancies, outcome expectations, behavioral capability and self-efficacy. For example, Rogers et al. (1999) reported positive effects of a narrative radio soap opera broadcast *Twende na Wakati (Let's Go with the Times)* in Tanzania with the intention to change family-planning behavior. Results showed that listeners were able to discern positive, negative and transitional role models and were more likely to identify with the positive role models portrayed in the program.

As discussed previously, images have been shown to be impactful in conveying messages (Green & Brock, 2002). In addition, they are memorable and more likely than

non-graphic materials to capture and focus attention, thereby facilitating observational learning. Graphic literature, including illustrated, entertaining stories such as photonovellas and comics, has been used to promote healthy behaviors with some success, using characters and storyline to convey messages to the reader. For example, an internet-based intervention, *Fit for Life*, focused on promoting physical activity in 10-14 year old Boy Scouts (Jago et al., 2006). Activities included skill building activities at troop meetings and Internet-based role modeling, goal setting, goal review and problem-solving. There was a weekly animated role-modeling comic in which characters faced and overcame a physical activity barrier. Results indicated a 12-minute reduction in sedentary behavior approaching significance ($p=0.051$) and a 12-minute significant increase in light intensity activity (Jago et al., 2006).

A Manga comic with its storytelling through detailed images and text may influence the critical SCT constructs associated with behavior change, through observational learning and transportation.

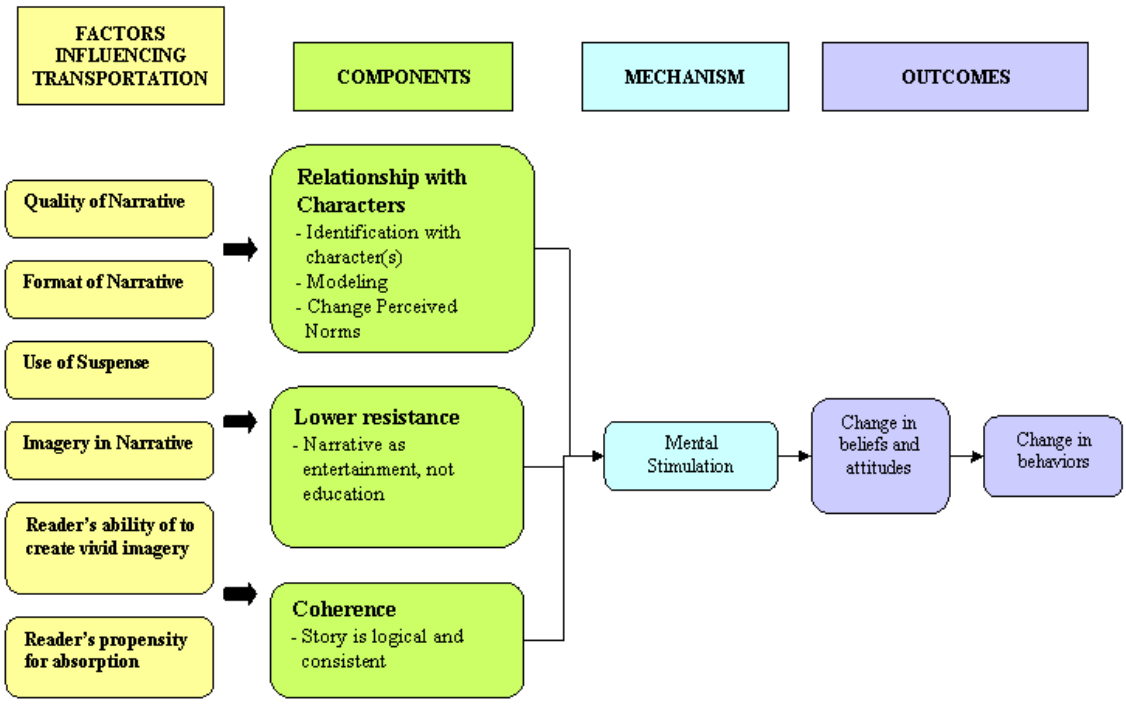
III.C. Summary

As the rate of childhood obesity remains high, it is important to seek innovative and wide-reaching methods to connect with youth living in a multi-media world filled with video games, computers and television. Numerous interventions have been designed to promote healthy behaviors in youth, however, most have resulted in modest positive outcomes and limited reach.

As narrative approaches are emerging as promising tools for motivating and supporting health-behavior change, Manga comics may be effective vehicles to convey

health messages and presents a largely untapped mechanism and opportunity to promote healthy behaviors in the youth population.

Figure 3.1 Transportation-Imagery Model



CHAPTER IV

NUTRITION AND PHYSICAL ACTIVITY MESSAGES IN MANGA COMICS: A CONTENT ANALYSIS

IV.A. Abstract

Childhood obesity is a serious public health problem. Multiple factors are associated with the rise of this epidemic, including media use. Manga comics (Japanese comic art) is a popular form of media among US youth, however, there is no empirical evidence on obesity-related content in Manga comics. This study content analyzed the nutrition and physical activity (PA)-related behaviors present in eight popular youth Manga comics. Results showed that *Shojo* (Girls) comics had more nutrition-containing scenes (N=72 vs. N=39), while *Shonen* (Boys) comics had more PA-related scenes (N=160 vs. N=67). There tended to be a difference (χ^2_1=3.26; p=0.07) in frequency of positive and negative nutrition-related scenes, while a significant difference (χ^2_1=8.2; p=0.004) in frequency of positive and negative scenes with PA was observed between the comic categories. Fruit and vegetable consumption, family meals and moderate to vigorous PA were the most frequent positive health behaviors represented, while large portion sizes, consumption of high energy-dense foods and television and screen time usage were the most frequent negative health behaviors depicted. Findings highlight how obesity-related behaviors are presented in popular youth Manga comics, which may contribute to our understanding of children's beliefs and attitudes towards these behaviors.

IV.B. Introduction

Childhood obesity continues to be a serious public health issue in the US. Over the last three decades, the rate of childhood obesity has tripled, with more than one-third of 6 to 19 year olds now considered overweight or obese (Ogden et al., 2006). Obesity has extensive economic, physical and psychosocial consequences, including long-term consequences leading into adulthood (Daniels, 2006; Guo, Chumlea, Roche, & Siervogel, 1998; Guo & Chumlea, 1999; Rolland-Cachera, Bellisle, & Sempe, 1989; Trasande, Liu, Fryer, & Weitzman, 2009; Whitaker, Wright, Pepe, Seidel, & Dietz, 1997).

Multiple factors have contributed to the rise of this complex epidemic resulting in dietary intake patterns and activity-related behaviors that are not in line with national recommendations and guidelines (Field, 2008; James, Thomas, Cavan, & Kerr, 2004; Ludwig, Peterson, & Gortmaker, 2001). One factor that has been associated with childhood obesity is youth's exposure to media as rates of childhood obesity has risen at similar time points as the use of television and other forms of media (Escobar-Chaves & Anderson, 2008). While there is still much to understand in regards to how television and internet may influence youth's perceptions, other forms of media exist that may also be shaping children's attitudes and beliefs towards nutrition and PA behaviors.

One form of media that has yet to be explored is Manga comics (Japanese comic art). They are a unique form of multimodal narrative media that combine detailed visual images and text. Manga comics are a popular form of entertainment in many countries, including the US where sales in 2009 topped over $96 million (The Nielsen Company, 2010). Similar to television programs, Manga comics may influence the way children perceive health information as certain theories suggest that messages conveyed in a

narrative (storytelling) format could be effective in influencing attitudes and beliefs. The Transportation-Imagery Model (TIM) posits that narrative persuasion occurs because an individual is 'transported' into the narrative world, which results in "an integrative melding of attention, imagery and feelings focused on story events" (Green & Brock, 2002; Green et al., 2004). Additionally, images have also been frequently used in health communication. TIM suggests that these images are most impactful when they are embedded in a story, rather than provided in isolation (Green & Brock, 2002), thus visual images relevant to the story's messages, such as those incorporated in Manga comics, may further impact attitudes and beliefs.

Social cognitive theory (SCT) explains how media such as Manga comics could use observational learning to influence health-behavior change. Readers who relate to the characters in the comics and see them as role models may be more likely to perform the health behaviors which they model. By observing events or other people displaying certain behaviors, children may learn undesired health practices. Because storylines in different media forms, like Manga comics, could influence readers' knowledge, attitudes and behaviors, it is important to understand what kind of health information is being conveyed in this form of media. However, to the best of our knowledge, there has been no empirical evidence on obesity-related content in youth Manga comics.

Thus, the purpose of this study was to analyze the nutrition and PA-related content presented in popular *Shonen* (target audience: adolescent boys) and *Shojo* (target audience: adolescent girls) Manga comics in the US and identify the demographic and personality traits of the comic characters modeling the obesity-related behaviors.

IV.C. Methods

Sample.

A total of eight popular youth Manga comic books in the US (4 *Shonen* and 4 *Shojo* comics) across different genres were selected for the content analysis. Popularity of comics was determined by readership circulation. To determine readership circulation of Manga comics, websites of TokyoPop® and Viz Media, the two largest US Manga publishers, were accessed in January 2009. On these websites, sales of the company's published Manga comics for different age groups and genres are listed. Manga comics are also often read on-line, in which Manga fans set up websites where comics are uploaded and can be accessed at no cost. Therefore, three of the most popular on-line Manga websites were also viewed to determine the most downloaded *Shonen* and *Shojo* Manga comics.

To determine the most popular websites, Manga blogs were visited where simple questions about the "best" websites to read Manga comics on-line for youth were presented to Manga fan 'bloggers'. The three Manga websites we visited were: www.onemanga.com, www.mangafox.com and www.mangahut.com. These Manga websites have updated data documenting the number of downloads for each Manga comic. The most popular Manga comics were defined as the comics that had the greatest number of downloads on the day that the website was accessed in January 2009. This information was collated to select the sample of 8 Manga comic books. The selected *Shonen* comic books included Dragonball, Deathnote™, Bleach and Naruto™. The *Shojo* comic books included Kitchen Princess, Vampire Knight, Fruits Basket™ and

Loveless™. Table 4.1 summarizes the storyline for and lists the genres of each selected comic book. We analyzed the first volume in each of the series.

Measures.

The basic unit of analysis was a scene. A scene change is denoted by a change in the continuity of action or a disruption in character interaction by other characters or events (Parsons, Rissel, & Douglas, 1999). Each scene containing a nutrition and PA-related content/behavior (NPCB) was analyzed in the selected sample of Manga comics (Parsons et al., 1999).

The coding instrument developed had three parts. Part 1 focused on descriptive data about the comic book (e.g., title, genre and volume issue). The purpose of Part 2 was to describe each NPCB scene's content dimensions. This included the type of content/behavior and message polarity. Part 3 focused on traits of the characters involved. These dimensions are explained in further detail below.

The recommended and suggested targeted behaviors to prevent childhood obesity devised by the Expert Committee were used as a guide to define what was categorized as a NPCB (Barlow & Expert Committee, 2007). Table 4.2 lists the Expert Committee's recommended and suggested targeted behaviors. The polarity of the message was also coded as positive or negative. Positive was defined as a recommended content/behavior to prevent childhood obesity, while negative was defined as a content/behavior that is positively associated with childhood obesity.

Demographic information of the characters associated with the health content or modeling the health behaviors was also collected. In addition to typical demographic information such as gender and age, weight status was also collected. This was

determined by the coders coming to together to review a sample of Manga comic character silhouettes and agreeing upon the silhouettes that best represented each weight category (underweight, normal weight and overweight). Personality traits of the characters were also collected. Three adjective pairs, that have been used in previous research to denote traits of characters portrayed in health-related scenes, were used to assess personality traits-smart/stupid, admirable/despicable and powerful/powerless (Mathios, Avery, Bisogni, & Shanahan, 1998). The possible responses included *Very applicable* and *Somewhat applicable* for each adjective within the pair. *Not applicable* was also a response option if the adjective pair did not apply to the situation (Mathios, Avery, Bisogni, & Shanahan, 1998). Similar to determining the definition of weight status, the coders convened to review a sample of comic characters and scenes in which they portrayed the selected personality traits. Through multiple discussions and review of sample scenes, definitions of the personality traits were developed and agreed upon by the coders.

Data Collection.

Two coders were used for the coding process. Multiple training sessions were conducted in which the two coders pilot coded a sample comic using the developed code book (Appendix A) and coding form (Appendix B). Inter-coder reliability and feasibility of the coding process was assessed. An inter-coder reliability score of 75% agreement or greater was deemed acceptable to move forward with the data collection process (Neuendorf, 2002).

Final coding was done by each coder independently. The coders followed a two-step process. First, the coders read one chapter of the selected comic book without recording

any data. Then, the coders coded each scene in the chapter containing NPCB using the coding form. During this second step, the coders were able to stop and review the chapter as needed to ensure that all relevant information was completely and accurately recorded. The coder directly inputted data into the electronic form of the coding form to limit data entry errors. The coders also came together after every two comic books to examine coding reliability. Inter-coder reliability as percent agreement was calculated at 81.0% at the end of the data collection process.

Descriptive statistics, such as the frequency and percentage of positive and negative NPCB and character demographics of those modeling the behaviors were determined. Chi-squared analyses were also conducted to compare differences in frequency and polarity of scenes between *Shonen* and *Shojo* comics.

IV.D. Results

Table 4.3 displays the frequency of NPCB scenes in our sample of *Shonen* and *Shojo* comics. The number of nutrition and PA-related scenes significantly differed (χ^2_1=36.8; p<0.001) between the two categories of comics as *Shojo* comics had more nutrition-related scenes (N=72 vs. N=39), while *Shonen* comics had more PA-related scenes (N=160 vs. N=67).

Each NPCB scene was also examined for its polarity (e.g., whether it portrayed a behavior that was recommended by the Expert Committee). It was not possible to assess the polarity of 28 of the scenes because of its neutrality or because it contained both positive and negative content. The sample size for each behavior was too small to make meaningful statistical comparisons. However, an analysis of the scenes that could be assessed revealed that there tended to be a difference (χ^2_1=3.26; p=0.07) in the number of

positive and negative nutrition-related scenes between the *Shonen* and *Shojo* comics (Table 4.3). Slightly more than half (54%) of *Shonen* and one-third (36%) of *Shojo* nutrition-related scenes were positive. The most frequent positive nutrition behaviors depicted in both comic categories were fruit and vegetable consumption and family meals, while the most common negative nutrition behaviors presented were large portion sizes and consumption of high energy–dense foods in *Shonen* and *Shojo* comics, respectively.

While there was a significant difference (χ^2_1=8.2; p=0.004) in the number of positive and negative scenes related to PA between the two categories of comics, the majority of scenes that included PA content for both *Shonen* and *Shojo* comics were positive (71% and 90%, respectively). The most frequent positive PA behavior depicted in both *Shonen* and *Shojo* comics was moderate to vigorous physical activity (MVPA). However, the frequency of scenes including MVPA was higher in *Shonen* compared to *Shojo* comics (96 and 43, respectively). The most often presented negative PA behavior for both *Shonen* and *Shojo* comics was television or screen time usage. However, similar to MVPA frequency, the number of scenes depicting television or screen time usage was greater in *Shonen* compared to *Shojo* comics (41 and 7, respectively).

Table 4.4 presents characteristics of comic characters involved in scenes with nutrition and PA content. Majority of the characters involved in NPCB scenes were children or adolescents, of normal body weight (relative to how body weight is normally depicted in Manga comics), and were smart, admirable and powerful. Males were predominantly portrayed in PA-related scenes, regardless of polarity, while there appeared to be a balance of genders included in nutrition-related scenes. Approximately

19% of the characters in negative PA scenes were underweight. There appeared to be no differences in character demographics or personality traits in positive or negative scenes.

IV.E. Discussion

To the best of our knowledge, this is the first study to examine the nutrition and PA-content in youth Manga comics. Our results found that *Shojo* comics contained more nutrition scenes, while *Shonen* comics had more PA scenes. There also tended to be a difference in the polarity of the nutrition-related scenes with *Shojo* comics presenting more negative nutrition scenes, while a significant difference was observed in the polarity of scenes with PA content with *Shonen* comics displaying more positive PA scenes.

The most frequent positive nutrition behavior depicted in both comic categories was fruit and vegetable consumption. While fruits and vegetables may have been presented most often, research has consistently shown that US youth consume well under the recommended amounts of fruits and vegetables (Centers for Disease Control and Prevention, 2007; Resnicow et al., 1998). The other positive nutrition behavior often represented was family meals. Previous research has shown that youth who eat meals with their family report healthier dietary practices, such as consumption of breakfast and fruits/vegetable, in addition to improved psychosocial well-being, while an inverse relationship is found between family meal frequency and childhood overweight (Fulkerson et al., 2006; Gillman et al., 2000; Neumark-Sztainer, Hannan, Story, & Croll, 2003; Videon & Manning, 2003). About one-half and two-thirds of the nutrition-related scenes were negative in the *Shonen* and *Shojo* comics, with large portion sizes and high energy–dense foods as the most frequently depicted negative nutrition-related behaviors, which highlight a potential concern that youth readers are likely exposed to nutrition-

related content that does not reflect recommended nutrition guidelines. These results are consistent with previous studies that have examined nutrition content in other forms of media, such as television or movies (Bell, Berger, & Townsend, 2003; Byrd-Bredbenner, Finckenor, & Grasso, 2003). Poor dietary habits which are being reflected by the comic characters and in other media, such as increased portion sizes and consumption of high energy-dense foods have all been associated with childhood obesity (Field, 2008; James et al., 2004; Ludwig et al., 2001)

Physical activity is a major contributing factor for preventing childhood obesity (Barlow & Expert Committee, 2007). The majority of PA-related scenes in *Shonen* and *Shojo* comics were positive, with the most frequent positive behavior for both *Shonen* and *Shojo* comics being MVPA. While at least 60 minutes per day of moderate- to vigorous physical activity is recommended (U.S. Department of Health and Human Services, 2000), Nader and colleagues (2008) found that PA decreased significantly between the ages of 9 and 15 years in US youth with girls dropping below the recommended levels at a younger age than boys. Thus, the smaller number of positive PA messages embedded in *Shojo* comics may assist in further reinforcing such behaviors by providing a message of limited PA for girls. The most frequent negative PA behavior depicted in both comic categories was television and screen time usage. US youth ages 8 to 18 years spend roughly 4.5 hours per day watching television (Kaiser, 2010) and a total of 7.5 hours per day using multi-media, including the internet and computers. This amount has continued to increase over the years, further highlighting concerns related to mixed messages in our media.

The characters involved in the NPCB scenes most frequently were children or adolescents, of normal body weight, and were smart, admirable and powerful. The characteristics of the individuals involved in NPCB scenes may be reflective of main characters in Manga comics in general (Thompson, 2007), but not necessarily reflective of the U.S. population. For example, majority of the comic characters in our study were of normal weight and some even underweight, while more than one-third of 6 to 19 year olds in the US are considered overweight or obese (Ogden et al., 2006). Additionally, the personality traits of smart, admirable and powerful represent characteristics that youth often value or strive to obtain (Cohen, 2006; Schunk, 1986). Interestingly, there were no clear differences in character traits for positive and negative scenes, which further highlights concerns that the negative behaviors portrayed in Manga comics may be modeled by readers, particularly as characters can be effective role models when they are perceived to represent what readers wish to be like (Cohen, 2006; Schunk, 1986). Approximately 19% of the characters in negative PA-containing scenes were considered underweight, thus inaccurately portraying a serious potential consequence of sedentary behavior.

The images included in Manga comics present information related to important obesity-related behaviors. As a narrative media, Manga comics may provide information in such a way that the reader is "transported" into the story and responds positively to the story's messages (Green & Brock, 2002). Such content could provide readers with important information on recommended behaviors to prevent obesity, like fruit and vegetable consumption or MVPA (Barlow & Expert Committee, 2007). At the same time, information can be detrimental if they encourage poor health habits, such as

consumption of high energy-dense foods or television and screen time use (Barlow & Expert Committee, 2007).

The findings of this study help to increase our awareness of how important obesity-related behaviors are presented in popular youth Manga comics, which may enable health professionals and educators to more fully understand youth's beliefs and attitudes towards health behaviors. However, it is important to note the limitations of this study. First, the sample was limited-only eight comics (4 *Shonen* and 4 *Shojo*) were included in the content analysis. Additionally, the sample was too small to determine differences across genres of youth Manga comics. Finally, only the first volume in each series was included in the sample. It is possible that the first volume may not be representative of the frequency and types of NPCB that may have been depicted in other volumes in the series.

Future studies should examine the context of the behaviors that were depicted in these Manga comics. Furthermore, research should extend beyond content analyses to examine the perceptions of the readers themselves as the researchers cannot be sure that youth comic readers perceive what the researcher perceives. Despite the limitations of the study, the findings do highlight how obesity-related information is presented in popular Manga comics and may contribute to our understanding of children's beliefs and attitudes towards these behaviors.

Table 4.1. Storyline and genres of selected Manga comic books (Thompson, 2007)

Title	Genre	Storyline
Shonen		
Bleach	Action, Fantasy	A male teenager with the ability to see ghosts is conscripted to fight evil ones and exorcise good ghosts.
Deathnote™	Mystery, Suspense	A high school male discovers a "Death Note", which has the power to kill anyone whose name is written inside. He attempts to create and rule a world cleansed of evil using the notebook.
Dragonball	Comedy, Martial Arts	A super-strong monkey-tailed boy is roped into a teenage girl's quest for the seven mystical Dragon Balls, which when collected will summon a dragon and grant any wish.
Naruto™	Action, Adventure, Fantasy	An adolescent ninja searches for recognition and aspires to become a Hokage, the ninja in his village that is acknowledged as the leader and the strongest of all.
Shojo		
Fruits Basket™	Drama, Fantasy, Romance, Comedy	A teenage orphan girl who lives alone, one day meets a strange family who are cursed to transform into cute talking animals when embraced by anyone of the opposite sex.
Kitchen Princess	Cooking, Romance	An orphan girl with a talent for cooking, transfers to an academy to follow her dream of being a great chef, and to find her "Flan Prince", a boy who saved her from falling into a river and gave her a cup of flan.
Loveless™	Drama, Fantasy, Mystery	A 12 year old latchkey kid is seeking counseling due to child abuse and his older brother's mysterious death. One day he meets a mysterious young man who once knew the boy's older brother and vows to protect him.
Vampire Knight	Romance, Vampire	A girl who was once saved from a vampire when she was young, now attends a boarding school where the "day class" of humans coexists uneasily with the "night class" of alluring, but not necessarily evil vampires.

Table 4.2. Expert Committee's targeted behaviors to prevent childhood obesity

Recommended	**Suggested**
Nutrition	
Limiting consumption of sugar-sweetened beverages	Eating a diet rich in calcium
Encouraging consumption of diets with recommended quantities of fruits and vegetables	Eating a diet high in fiber
Eating breakfast daily	Eating a diet with balanced macronutrients
Limiting eating out at restaurants, particularly fast food	Encouraging exclusive breastfeeding to 6 months of age and maintenance of it after introduction of solid food to ≥12 months age
Encouraging family meals in which parents and children eat together	Limiting consumption of energy-dense foods
Limiting portion size	
Physical Activity	
Limiting television and other screen time	Promoting moderate to vigorous physical activity for at least 60 minutes

Table 4.3. Frequency of positive and negative scenes related to nutrition and physical activity

Content	**Frequency (%)**				
	Shonen		***Shojo***		
	Positive	Negative	Positive	Negative	Total N
Nutrition					
Breakfast	4 (57.1)	3 (42.9)	1 (100.0)	-	8
Breastfeeding	-	-	-	-	
Calcium-rich foods	2 (100.0)	-	-	-	2
Diet with balanced macronutrients	-	-	2 (100.0)	-	2
Family meals	4 (66.7)	2 (33.3)	7 (100.0)	-	13
Foods high in fiber	1 (100.0)	-	3 (100.0)	-	4
Fruits and vegetables	6 (100.0)	-	12 (85.7)	2 (14.3)	20
High energy-dense foods	1 (25.0)	3 (75.0)	1 (2.4)	40 (97.6)	45
Portion sizes	1 (12.5)	7 (87.5)	4 (33.3)	8 (66.7)	20
Restaurants (particularly fast food)	-	4 (100.0)	1 (33.3)	2 (66.7)	7
Sugar-sweetened beverages	1 (50.0)	1 (50.0)	-	-	2
Other	4 (44.4)	5 (55.6)	4 (50.0)	4 (50.0)	17
Total N	21 (53.8)	18 (46.2)	26 (36.1)	46 (63.9)	111
Physical Activity					
Active Transportation	16 (84.2)	3 (15.8)	13 (100.0)	-	32
Moderate to vigorous physical activity	96 (97.0)	3 (3.0)	43 (97.7)	1 (2.3)	143
Television and other screen time	1 (2.3)	41 (97.6)	-	7 (100.0)	49
Other	-		4 (100.0)	-	4
Total N	113 (70.6)	47 (29.3)	60 (89.6)	7 (10.4)	227

Note. Nutrition and PA-content frequencies and percentages are not additive as a scene could include more than one health content area.
Percentages reported are for positive or negative scenes for each comic category.

Table 4.4 Characteristics of comic characters involved in scenes related to nutrition and physical activity

	Nutrition		**Physical Activity**	
Characteristics	Positive	Negative	Positive	Negative
Being (%)				
Male	45.8	43.0	56.3	67.9
Female	39.8	43.9	24.1	8.3
Animal	2.4	2.6	4.7	2.4
Other	12.0	10.5	14.9	21.4
Age (%)				
Child/Adolescent	79.4	78.9	70.6	66.6
Adult	6.2	10.5	12.6	8.3
N/A	14.4	10.6	16.8	25.0
Body Weight (%)				
Under	3.9	-	4.0	19.0
Normal	92.1	96.3	86.1	76.2
Over	1.3	2.8	5.2	1.2
N/A	2.6	3.7	4.8	3.6
Personality Traits				
Smart/Stupid (%)				
Smart	78.9	53.2	68.6	85.7
Stupid	9.2	20.7	20.0	4.8
N/A	11.8	26.1	11.4	9.5
Admirable/Despicable (%)				
Admirable	70.4	63.7	60.5	59.5
Despicable	12.3	19.5	23.0	23.8
N/A	17.3	16.8	16.4	16.7
Powerful/Powerless (%)				
Powerful	54.3	62.2	70.2	82.1
Powerless	13.6	16.7	11.1	7.1
N/A	32.1	21.1	18.7	10.7

Note. Numbers represent percentage within each health and polarity category

CHAPTER V

"HE'D BE A TROUBLE MAKER, BUT WOULD HAVE A HEART OF GOLD.": FORMATIVE RESEARCH FOR DEVELOPMENT OF A MANGA COMIC PROMOTING HEALTHY EATING IN YOUTH RESPONSES

V.A. Abstract

Innovative interventions addressing childhood obesity are needed to capture the attention of youth living in a multi-media environment. The purpose of this qualitative study was to inform development of an appealing Manga comic (Japanese comic art) to promote positive dietary behaviors in youth. Seven focus groups and two interviews (N=28) were conducted with middle-school students to better understand such topics as enjoyable components of Manga comics and important health concepts. Two researchers independently reviewed each transcript. Inductive and deductive processes were used to identify codes (ideas emerging from text); similar codes were grouped into themes. Most frequently mentioned themes related to enjoyable components of Manga comics were detailed graphics and artistic style of text used to convey sound effects. The majority said eating fruits and vegetables was the most important nutrition behavior for proper health. When asked about story ideas for a Manga comic to encourage youth to be healthy, many responded with ideas involving comic characters who would consume fruit, then gain beneficial attributes. Others suggested highlighting more practical benefits, such as increased focus and energy. Manga comics hold promise for creating an entertaining and informative learning environment that has potential to help promote behavior change in youth.

V.B. Introduction

Childhood obesity continues to be a serious public health issue in the US. Over the last three decades, the rate of childhood obesity has tripled, with more than one-third of 6 to 19 year olds now considered overweight or obese (Ogden et al., 2006). Obesity has extensive economic, physical and psychosocial consequences, including long-term consequences leading into adulthood (Daniels, 2006; Guo, Chumlea, Roche, & Siervogel, 1998; Guo & Chumlea, 1999; Rolland-Cachera, Bellisle, & Sempe, 1989; Trasande, Liu, Fryer, & Weitzman, 2009; Whitaker, Wright, Pepe, Seidel, & Dietz, 1997). Childhood obesity is a complex epidemic with multiple contributing factors. Poor eating habits, including inadequate intake of fruits and vegetables and increased intake of sugar-sweetened beverages, have all been associated with childhood obesity (Field, 2008; James, Thomas, Cavan, & Kerr, 2004; Ludwig, Peterson, & Gortmaker, 2001). Food preferences established in childhood are often maintained into adulthood (Mikkila, Rasanen, Raitakari, Pietinen, & Viikari, 2004), thus highlighting the importance of promoting healthy dietary behaviors during childhood and adolescence.

Low cost, large scale interventions are needed to address such a prevalent problem as many childhood obesity prevention interventions have been too costly to maintain and resulted in modest positive outcomes and limited reach (Thomas, 2006). Furthermore, innovative programs are needed to capture the attention of youth living in a multi-media environment. Interventions that incorporate narratives may engage today's younger population. Narratives, which have been used to change beliefs and inspire action, are now emerging as promising tools to support health-behavior change (Green, 2006; Hinyard & Kreuter, 2007).

Manga comics, which are Japanese comic art, may be a novel platform to promote positive health behaviors in youth. They are a unique form of multimodal narrative media that combine detailed visual images and text. Manga comics are a popular form of entertainment in many countries, including the US where sales in 2009 topped over $96 million (The Nielsen Company, 2010). Because of their popularity, Manga have been used as a form of education-entertainment for topics, such as history, culture, religion and career advice, around the world (Berfield, 2008; Hodder & Stoughton, 2007; Kaplan, 2007); however to date, Manga comics have not been used for health behavior change interventions.

Theoretical Framework.

The transportation-imagery model (TIM) explains how narrative communications, such as Manga, could contribute to changes in health-related beliefs and behaviors (Green, 2006). TIM posits that narrative persuasion occurs because an individual is 'transported' into the narrative world (Green & Brock, 2002). Transportation is defined as "an integrative melding of attention, imagery and feelings focused on story events" (Green, Garst, & Brock, 2004). TIM applies specifically to narratives, particularly ones that evoke vivid imagery, as opposed to "didactic rhetoric" (Green & Brock, 2000; Green & Brock, 2002).

Transportation into a narrative world is believed to lead to acceptance of persuasive messages within a story through multiple mechanisms (Green & Brock, 2002; Green et al., 2004). The first mechanism is the relationship with characters. If a reader likes or identifies with a specific character, the events experienced or statements made by the character may have a greater effect in shifting the reader's beliefs (Green, 2006).

Transportation may also elicit belief changes by lowering resistance to the messages in the narrative. Resistance, defined as a reaction against change or a motivation to oppose persuasive appeals, is a key barrier to changing attitudes and behaviors (Knowles & Linn, 2004). Narratives may be particularly effective at overcoming resistance as narrative evidence has been shown to be more effective than fact-based evidence, particularly when messages are not similar to one's own beliefs. For example, Slater and Rouner (1996) found that alcohol-education messages based on anecdotal evidence were considered more persuasive and believable than those based on statistical evidence among college students whose values differed to the educational messages.

A third potential mechanism of transportation is coherence, in which a story is logical and consistent. Researchers are learning that readers have different expectations of a narrative depending on its storyline or genre (M. C. Green, personal communication, August 2008). While a biography may be expected to describe realistic events, a science fiction narrative may be expected to have more fantastic events. Thus, a consistent and logical story that meets the expectations of a reader may result in more positive responses to the story's messages.

Images have also been frequently used in health communication. TIM suggests that these images are most impactful when they are embedded in a story, rather than provided in isolation (Green & Brock, 2002), thus visual images relevant to the story's messages, such as those incorporated in Manga comics, may further impact attitudes and beliefs.

Social cognitive theory (SCT) highlights another mechanism through which narratives that include characters to whom readers can relate, like Manga comics, could influence health-behavior change. By observing a role model (observational learning), individuals can learn a behavior and will be more likely to perform it, if they see the model rewarded for the behaviors in ways that they value (Baranowski, Perry, & Parcel, 2002). The development of entertainment-education narratives draws greatly on SCT by using role models to perform new behaviors, which aim to improve outcome expectancies, outcome expectations, behavioral capability and self-efficacy. A Manga comic with its storytelling through detailed images and text may influence the critical SCT constructs associated with behavior change, through observational learning and transportation.

The purpose of this study was to conduct qualitative research that informed the development of an appealing Manga comic to promote positive dietary behaviors, for preventing childhood obesity in middle-school youth.

V.C. Methods

Sample.

In Spring and Summer 2009, we conducted seven focus group discussions (26 participants total) with sixth to eighth graders in central North Carolina. In addition, two in-depth interviews were conducted as a result of only one student attending a scheduled group discussion. Recruitment occurred at three middle schools during after-school programs and gym classes by research staff. The research staff attended the programs and classes to explain the purpose of the study to the students. Students who expressed interest received information about the study and parental consent forms. Participants

received small gifts (e.g., stationery, water bottles, school supplies) that were valued at $5. The study was approved by the school districts and the Public Health-Nursing IRB at the University of North Carolina at Chapel Hill.

Data Collection.

The discussion guide (Appendix F) consisted of 30 open-ended questions, probes and follow-up questions, covering topics such as: Manga stories youth prefer to read; enjoyable aspects of Manga comics; and health concepts youth want to read about. Questions relating to values and ideals of the youth were also included. The Manga-related questions (eight questions) were only asked to the youth who read Manga comics. Prior to completing the focus groups and interviews, the discussion guide was pilot-tested by a trained moderator and minor modifications were made based on feedback and responses. The principal investigator and trained research assistants conducted the discussions and interviews, which lasted approximately 40 to 60 minutes, in a classroom setting during gym class or after school. Informed consent was obtained from parents, and informed assent was obtained from students. Prior to the start of the discussion, participants completed a brief socio-demographic questionnaire.

When possible (five out of the seven), focus groups were segmented by gender and grade because previous research indicate that students are more comfortable in sharing thoughts and opinions related to nutrition and physical activity in similar groups (Leslie et al., 1999; Robbins, Pender, & Kazanis, 2003). Groups were also separated according to Manga and non-Manga readers. We conducted three focus groups first. Following this, two in-depth interviews were conducted. The interviews occurred due to only one participant arriving to a scheduled focus group discussion. Therefore the

interviews were not intended, however, we took the opportunity to ask the same questions with the aim to probe for more detail and gain a better understanding of the discussion guide, which helped to refine the questions. The other four focus groups were then conducted.

Data Analysis.

Focus groups and interviews were audio taped and transcribed verbatim. All transcripts were reviewed to check for accuracy and completeness against the audiotapes. Transcript texts were loaded into Atlas.Ti, version 5.2, a software program designed to analyze text-based data. We used inductive and deductive processes to identify codes (ideas emerging from the text), themes (groups of similar codes) and categories (general domains of information covered).

A preliminary codebook was developed by one researcher upon initial review of the data. The codebook was then reviewed by two researchers to ensure standardized definitions of the codes. We then independently reviewed each transcript to identify additional codes and discrete units of text (phrases, sentences, paragraphs) that corresponded to specific codes. The two reviewers compared their coding and resolved any discrepancies through discussion and consensus. Upon completion of coding, we merged codes with similar meanings for data reduction. This process also assisted with the identification of themes. The coding reports were then summarized by key themes, also identifying text evidence for those themes.

V.C. Results

Participants.

A total of 28 middle school students participated in the study; about half of the participants were male (57%) and had read Manga comics (61%), while the majority were sixth graders (93%). The mean age was 12.4 years, with a range of 11.6 to 14.6 years. One interviewee was a sixth grader (similar to the focus group participants), while the other interviewee was an eighth grader who was more mature and able to articulate his thoughts in greater detail. Table 5.1 lists demographic information of the focus group and interview participants.

Discussions and Interviews.

The data from the focus groups and in-depth interviews were broken down into three categories: a) Components of Manga comics that may increase transportation, b) Storyline that would interest the target population, and c) Main characters to whom youth would likely relate. Table 5.2 summarizes the key themes from each of the categories.

Components of Manga comics that may increase transportation. To understand the components of Manga comics that may increase transportation, Manga-reading participants were asked, "What do you like about reading Manga comics?" One of the most frequently mentioned topics was the visual images of Manga comics. Both male and female participants agreed that the drawings of Manga comics are unique relative to other comics because of the detail. They mentioned that this style of detailing is often used when conveying speed and intensity of action scenes and emotions of characters through exaggerated facial expressions.

The drawings are cool, and…I like the expressions they use, like when they get mad…and it shows... OOOoooh!! I want to scream myself! (focus group participant, female)

Another common topic that was discussed was the incorporation of onomatopoeia (use of words to denote sounds) into Manga comics. Readers explained that the artistic style and sizes of the text, which are used to express different types and levels of sound effects, were enjoyable to read.

[I like] the sound effects. …they always catch my eyes. Cuz it's not just written there. It's a special way of 'BOOM'. If it says boom it's gonna be the letters are all big and if it's something quiet then they can make it small. So, the different sizes actually convey the noise and the way they write it. (focus group participant, male)

When prompted as to the reasons these factors resulted in enjoyment of the stories, many of the participants reported feeling that they became a part of the story as they read.

When you're reading [the Manga comics], you just don't think about anything. You just...read. You just feel like part of the book, and you don't really think about…like how a good person you are, you just feel like...part of the book….I feel like I'm in the story. (focus group participant, female)

Others reported they could hear the voices of the characters in their mind as they read and one male focus group participant said that reading a Manga comic was like "*watching a movie*".

Storyline that would interest the target population. To develop a storyline that would appeal to the target population, Manga readers were asked "Of the Manga stories you have read, which one is your most favorite?". Naruto™[1] was overwhelmingly the favorite Manga comic for both males and females. When prompted to explain why, the youth reported that the storyline has action, adventure, fantasy and humor. Others mentioned, in addition to action, Naruto™ has a well developed storyline and message.

> *[I like] Naruto b/c it's action, but…it has a concept. Like "Don't fight because war doesn't solve everything. And it's a fun story." (focus group participant, male)*

A few of the females did prefer stories that they thought were more realistic, such as Fruits Basket™[2].

> *[I like] Fruits Basket because you can relate to it, it's more realistic than Naruto. Not everybody's going to go hike up the mountain and fight crime. It's more realistic like the romance and it's funny" (focus group participant, female)*

While not a main genre of the comic, romance is incorporated in Naruto™. Only two readers mentioned this when asked why they enjoyed the story. We followed up by asking the other readers of the comic if they thought there was romance in the comic. All the readers, regardless of gender, acknowledged that romance existed in the story, to some degree. Two males and one female commented that they found those scenes humorous.

It was also important to develop a storyline that would appeal to youth who do not read Manga comics. Thus, we asked non-Manga readers, "If you could pick up any book to read, what would it be?" The majority of non-Manga readers expressed the desire for books with fantasy, action and suspense. Some expressed interest in comic books, however, not specifically Manga comics. A couple of the females wanted to read books that included romance.

Next, we asked both Manga and non-Manga readers "What food and nutrition topics do you think are most important to your health?" This question aimed to identify an appealing health topic that could be incorporated into a storyline related to health. Most participants said that eating fruits and vegetables is important for proper health. A

few others reported that junk food should be avoided. Diet was the ma[1]in focus, but a couple of participants did mention the importance of physical activity. The explanations given for the importance of eating fruits and vegetables were that they provide energy, prevent weight gain and increase strength.

We followed up by asking the participants to tell us ideas for a comic that would encourage other people their age to be healthy. Most of the participants suggested ideas involving characters who eat fruit, then gain a beneficial attribute such as a special power.

> *I would have regular people. But when they eat fruit... they get magical powers. (focus group participant, male)*

However, there were still a substantial number of ideas related to highlighting the practical benefits of eating fruit, such as increased focus and energy and a decreased risk of becoming overweight. Several participants also expressed a strong preference for comics that did not blatantly try to educate the reader. The participants did not appreciate educational material being presented as entertainment.

> *My friends are exactly like me. They hate books that are educational... [The comic] needs to be so that you don't know you're learning, but you're learning. (in-depth interviewee)*

Main characters to whom youth would likely relate. To inform the development of characters to whom youth could identify or relate, Manga readers were asked "Which [Manga comic] characters are your most favorite?" Several characters were mentioned, but again Naruto™ was cited as the favorite. When prompted as to why they chose a specific character, several personality traits were repeated. Those traits included, 1)

[1] Japanese manga series written and illustrated by Natsuki Takaya. It is about Tohru Honda, an orphan girl and her experiences with the Sohma family, a group of mysterious and attractive people.

Humor, whether it was behaviorally such as being clumsy or through exaggerated emotive facial expressions; 2) Strength, either physical or emotional; 3) Integrity, such as fighting for a just cause; and 4) Vulnerability, such as feeling isolated at school. The participants reported that they related to the main characters as the characters exhibited traits they respected or reminded the participants of themselves because of perceived similar personalities.

> *"My favorite character is the anger-management dude from Fruits Basket™ because he has anger management issues, and it's really funny. Plus, I have anger issues, too." (focus group participant, female)*

To further inform development of a comic character, participants were also asked "If you were to create a story, who would be the main character?" The most common topics discussed were age, gender and personality. The participants tended to describe a character in their mid- to upper teens (slightly older than themselves). They also preferred a main character who is unpopular or misunderstood; however, s/he would have strong positive values. Male participants wanted a male character, while female participants preferred a female character.

> *He'd be a trouble maker, but would have a heart of gold. (in-depth interviewee)*

> *[The main character would be] not popular. But when something happens, she's outgoing and gets braver and all that. (focus group participant, female)*

Main characters of Manga comics often possess a special power so to further aid our knowledge in character development for a Manga comic, we asked the participants "If you could have one power, which power would that be-magical (e.g., ability to create storms) physical (e.g., martial arts skill) or brain power (e.g., telepathy, telekinesis)?". Magical and physical powers were the most popular for both male and female participants. The least popular response was brain power. The magical powers most

often mentioned included, 1) being able to fly so one can travel the world, 2) being invisible so one could hear conversations and secrets of other people, and 3) being able to time travel, either back into the past to see dinosaurs or into the future to see what the future holds for them.

Some common themes of physical powers included having martial arts skills or being able to run fast. The main reason for desiring such powers was to ultimately defend oneself from others, in particular, school bullies.

> *I would be Bruce Lee. 'Cause...if someone try to mess with me, all I gotta do is...[showing martial arts moves with his arms]...and he'd be down. (focus group participant, male)*

> *I would love to be able to run fast. That'd be one very useful power! Some people pick on me…so all these people chase me a lot of the time…I don't want to get tackled by this kid going 20 miles an hour. (in-depth interviewee)*

To better understand character traits that readers value, we asked the participants "If you could have one wish for yourself, what would it be?" The most common responses involved either doing something to benefit the current state of the world (environmentally, economically, or through humanitarian means) or to become rich. When prompted for the reasons behind their desire for wealth, a couple of participants mentioned they wanted to be able to purchase material goods. However, the majority stated they would use the money to help people in need.

> *I'd use my wish so there wouldn't be anything else. No more global warming... I'd use my wish on the world so... there wouldn't be no more chaos and stuff like that. (focus group participant, male)*

> *Money! Well, I mean... I'm sorry, but money 'cause then I'd…build a house for homeless people, put them in there... Take care of them, feed them good. (focus group participant, female)*

Next, we asked the participants "What is important to you?" to further identify current values of youth. The participants most frequently mentioned friends, family and *"doing the right thing"*. Also, the participants commonly said that they consider it important to be virtuous.

> *"Being a good person. First of all, don't bully people. Stand up for other people, stand up for yourself, and help everybody once in a while." (focus group participant, female)*

V.E. Discussion

Findings from this study were used to inform the development of a Manga comic to promote positive dietary behaviors in youth. The data helped to enhance the comic's potential for effectiveness and appeal to middle-school youth. As transportation could be an effective mechanism for promoting health behavior change, particularly with narratives such as comics, components of Manga comics that may enhance it should be tested (Hinyard & Kreuter, 2007). According to the data collected, these components include the details of the graphics and the artistic style of text that is used to convey sound effects. The detailed graphics tend to be used when conveying action scenes, emotions of characters through exaggerated facial expressions, and background scenery, which may create a sense of being within the story. The text may also help to increase sensory perceptions of the scenes. The unique style and technique of Manga comics may promote greater audience participation, which can lead to increased attention and mental imagery focused on the story's events. Thus, based on the TIM, it is possible that readers of Manga comics may become 'transported' into a story and possibly be more persuaded by the messages within.

Ensuring a proper balance between the entertainment and education of the comic further increases the potential for transportation (Green, 2006). The participants clearly stated that although a comic may be about fruits and vegetables, they do not want it to be educational. There was a strong preference for comics which did not blatantly attempt to educate the reader. Similar to other forms of narrative persuasion, entertainment-education must find a proper balance-there must be enough health information so that the message is effectively conveyed, however, not too much so the reader does not lose interest (Green, 2006). Thus, a comic storyline for youth should be entertaining, while health information is carefully embedded into the story.

Identifying the types of genres that appeal to middle school youth during formative research provided further guidance for the development of an appealing storyline for a health-related Manga comic. In the current study, most participants preferred stories related to action, adventure, suspense, fantasy and comedy, while some of the females favored romance. Previous research has shown that youth have a strong preference for imaginative literature, which includes fantasy and adventure (Bank, 1986; Chiu, 1984; Smith, 1962; Sturm, 2003). A study conducted by the American Library Association (2001) reported romance was a subject which ranked in the top five and teenagers were "absolutely passionate about" it. This suggests that regardless of the form of narrative, whether a book or Manga comic, genre preferences are similar in youth. Therefore, utilizing a mixture of genres in a health-related comic may appeal to both male and female youth.

When determining which obesity-related nutrition behavior should be incorporated into a story, it is important to identify a nutrition topic that the intended

population would value. This would further ensure appeal and engagement of the comic. Several nutrition and health topics were expressed by the participants, however, the majority believed that eating fruits and vegetables was the most important behavior to address. While the participants identified this behavior as important to their health, research has consistently shown that US youth consume well under the recommended amounts of fruits and vegetables (Centers for Disease Control and Prevention, 2007; Resnicow et al., 1998). Encouraging fruit and vegetable consumption is also a target behavior strategy identified by the Expert Committee to prevent and treat childhood obesity, further confirming that fruit and vegetable consumption would be an appropriate focus of a Manga comic (Barlow & Expert Committee, 2007).

Asking youth about stories of how to encourage people their age to be healthy can inform how the storyline could address SCT constructs. Many participants responded with ideas involving characters, who would consume a fruit and then gain a unique power or ability. Others suggested highlighting practical benefits of eating fruit, such as increased focus and energy.

To maintain consistency and coherence with popular Manga comics, the main characters of a health-related Manga comic should exhibit a special power. Drawing on student input in the present study, it appears that main characters should possess either magical powers (e.g., being able to fly or be invisible) or physical powers (e.g., martial arts skills) to defend oneself from others, particularly antagonistic characters such as school bullies.

Collecting information related to story ideas and character traits can guide how developers specifically address outcome expectations to ensure the storyline would cover

both practical and fantasy-related benefits of fruit consumption. Furthermore, observational learning through the role model displaying positive fruit consumption behaviors could enhance self-efficacy.

Characters can be effective role models when they are perceived to be similar and represent what readers wish to be like, not necessarily who they are (Cohen, 2006; Schunk, 1986). While majority of the participants wanted to read about a main character of their own gender, most of the Manga readers chose a male main character as their favorite, regardless of personal gender. Research has shown that male and female youth identify with male characters; both males and females tend to cite intelligence, while females also refer to the character's sense of humor as an important reason (Hoffner, 1996). In addition, most of the participants wanted a main character in their mid- to late teens, which is slightly older than themselves. Interestingly, participants also preferred a main character who is unpopular or misunderstood. These traits could reflect common experiences of the transitional and often disruptive stage of adolescence, when youth are in search of their own identity and independence, yet also seeking acceptance into peer groups (Christie, 2005).

While an appealing main character is crucial, it is also important to create multiple characters of both genders with different appearances and personalities, which provide opportunities for participants to identify with one or more characters. This is a critical component because according to TIM, if a reader likes or identifies with a character, the character's experiences or statements made by the character may have greater impact in shifting beliefs. An appealing character also provides an opportunity

for observational learning to have an effect, thus potentially promoting an increase in self-efficacy and positive outcome expectations.

The participants most frequently cited friends, family and *"doing the right thing"* when asked what they believe to be most important to themselves. While it was not surprising to find the youth mention friends as friendship is often seen as a framework for young people's development of individual identity, it was interesting to hear the youth refer to family. Adolescence is often viewed as a period of 'storm and stress' as youth try to break free from parents and seek independence (Robb, 2007). However, research does support the current study's results that family is an important component of the lives of today's youth (Gillies, Ribbens McCarthy, & Holland, 2001).

The participants also wanted to be able to promote positive change in society. These results have been found in previous research with adolescents from different cultures (Calvert, Murray, & Conger, 2004). A potentially effective Manga comic designed to encourage middle-school youth to consume more fruit would emphasize important values by featuring morally upstanding characters working towards improving society, with strong ties to friends and family.

In order for an intervention with Manga comics to be effective, it should be informed by both youth themselves and behavior change theory. Collecting formative research increases the potential for creating an entertaining and appealing product for the target population, while focus for the intervention is provided by a theoretical framework.

There are several limitations to this study that should be noted. First, the number of participants in our focus groups was smaller than traditional focus groups of eight to ten (Ulin, Robinson, & Tolley, 2005). However, because of the social norms and peer

group dynamics of youth, we aimed to promote honest and open discussions leading to more meaningful results by segmenting according to age and gender, which resulted in smaller groups. Another limitation is the limited generalizability of the results to all middle-school youth as the study sample was predominately sixth grade males. In addition, this study was conducted in central North Carolina, thus may not reflect opinions outside the geographic region. The sample was not large enough to identify clear differences between race/ethnicity, age and gender. However, strengths of the study include the diverse ethnicities represented by the study participants and the inclusion of non-Manga readers. In addition, the information collected has enabled the development of an appealing obesity prevention intervention using an innovative format based on youth's preferences.

As a complex public health problem, childhood obesity should be addressed at multiple levels and through various avenues. Health-promoting Manga comics could be one component of the many programs and interventions aimed at combating this multifaceted health issue. As a popular reading trend for US youth, Manga comics hold promise as potentially effective behavior change vehicles for youth by creating an entertaining and informative learning environment.

Table 5.1. Characteristics of Participants

	Focus Groups	**Interviews**	**Total N**
Gender			
Male	14 (50.0)	2 (7.1)	16
Female	12 (42.9)	-	12
Grade			
6	25 (89.2)	1 (3.6)	26
7	1 (3.6)	-	1
8	-	1 (3.6)	1
Ethnicity			
African-American/Black	9 (32.1)	-	9
White	7 (25.0)	1 (3.6)	8
Latino/Hispanic	5 (17.9)	1 (3.6)	6
Mixed Race	5 (17.9)	-	5
Manga Reader			
Yes	15 (53.6)	2 (7.1)	17
No	11 (39.3)	-	11

Note. Results presented as N (%), unless otherwise noted

Table 5.2. Key themes presented by categories

Components of Manga comics that may increase transportation	• Detailed visual images
	  ○ Conveys intensity of action scenes and emotions of characters
	• Artistic style of onomatopoeia
	  ○ Conveys different types and levels of sound effects

Storyline that would interest the target population	• Preferred genres
	  ○ Adventure, Action, Suspense, Comedy, Fantasy, Romance
	• Important nutrition topics
	  ○ Consume fruits and vegetables
	  ○ Avoid high energy-dense foods
	• Ideas for a comic to promote healthy dietary behaviors
	  ○ Comic character consumes fruit, then gains a unique ability or displays strength and energy
	• Balance between education and entertainment

Main characters to whom youth would likely relate	• Demographics
	  ○ Mid- to upper-teens
	  ○ Personal gender
	• Character traits/values
	  ○ Humor
	  ○ Strength
	  ○ Integrity
	  ○ Vulnerability
	• Special Powers
	  ○ Magical (e.g., time travel, be invisible)
	  ○ Physical (e.g., martial arts skills)

CHAPTER VI

FIGHT FOR YOUR RIGHT TO FRUIT©: PSYCHO-SOCIAL OUTCOMES OF A MANGA COMIC PROMOTING FRUIT INTAKE IN MIDDLE-SCHOOL YOUTH

VI.A. Abstract

Innovative interventions addressing childhood obesity are needed to capture the attention of youth living in a multi-media environment. The purpose of this study was to determine if exposure to a Manga comic (Japanese comic art) with embedded messages promoting fruit intake influenced related psycho-social variables in middle-school youth. A three-group, randomized single-session study was conducted. Participants included 263 middle-school youth, with a mean age of 13.2±1.1 years. Participants were randomly assigned to receive one of the following: 1) A Manga comic about Fruit (Comic group), 2) A Newsletter about Fruit (Newsletter group), or 3) A Newsletter about Ancient Greece (Attention-Control group). Outcome expectations, self efficacy and knowledge related to fruit consumption were measured at baseline and immediately after reading. Secondary outcomes included transportation (how much participants were immersed in their media), enjoyment, and engagement (measured by reading time), measured at post-test. Data were analyzed using regression analyses. Post-intervention focus groups were conducted to evaluate acceptability, perceived impact and comprehension of the Comic. Comic group participants reported greater outcome expectations related to fruit consumption compared to the Control group (p=0.03) and

greater transportation ($p<0.01$), enjoyment ($p<0.05$) and engagement ($p=0.00$) than the Newsletter and Control groups. Focus group data show that the majority of Comic group participants enjoyed the graphics and storyline, understood the main message about fruit and felt like eating more fruit after reading the comic. Study results are promising and suggest that Manga comics may be a useful format to promote positive health beliefs in youth. Further research should be conducted to explore its impact on health behaviors.

VI.B. Introduction

Childhood obesity continues to be a serious public health issue in the US. Over the last three decades, the rate of childhood obesity has tripled, with more than one-third of 6 to 19 year olds now considered overweight or obese (Ogden et al., 2006). Its prevalence has extensive economic, physical and psychosocial consequences, including long-term consequences leading into adulthood (Daniels, 2006; Guo, Chumlea, Roche, & Siervogel, 1998; Guo & Chumlea, 1999; Rolland-Cachera, Bellisle, & Sempe, 1989; Trasande, Liu, Fryer, & Weitzman, 2009; Whitaker, Wright, Pepe, Seidel, & Dietz, 1997). Childhood obesity is a complex epidemic and has been attributed to, among other things, poor eating habits such as inadequate intake of vegetables, fruit, and milk and increased intake of sugar-sweetened beverages (Field, 2008; James et al., 2004; Ludwig et al., 2001). Food preferences established in childhood tend to be maintained into adulthood(Mikkila, Rasanen, Raitakari, Pietinen, & Viikari, 2004), thus highlighting the importance of promoting healthy dietary behaviors during childhood and adolescence.

Many childhood obesity prevention interventions focused on improving dietary outcomes have resulted in modest positive outcomes and limited reach (Thomas, 2006). Interventions that incorporate narratives, such as education entertainment and

storytelling, may engage today's younger population. Narratives, which have been used to change beliefs and inspire action, are now emerging as promising tools to support health-behavior change (Green, 2006; Hinyard & Kreuter, 2007).

Manga comics, which are Japanese comic art, may be a novel platform to promote positive health behaviors in youth. They are a unique form of multimodal narrative media, which combines visual images and text. Manga comics are a popular form of entertainment in many countries, including the United States where sales in 2009 topped over $96 million (The Nielsen Company, 2010). Because of their popularity, Manga have been used as a form of education-entertainment for topics, such as history, culture, religion and career advice, around the world (Berfield, 2008; Hodder & Stoughton, 2007; Kaplan, 2007).

Theoretical Framework.

The Transportation-Imagery model (TIM) explains how narrative communications, such as Manga, can contribute to changes in health-related beliefs and behaviors (Green, 2006). TIM posits that narrative persuasion occurs because an individual is 'transported' into the narrative world (Green & Brock, 2002). Transportation is defined as "an integrative melding of attention, imagery and feelings focused on story events" (Green et al., 2004). TIM applies specifically to narratives, particularly ones that evoke vivid imagery, as opposed to "didactic rhetoric" (Green & Brock, 2000; Green & Brock, 2002).

Transportation into a narrative world is believed to lead to persuasion of messages within a story through multiple mechanisms (Green & Brock, 2002; Green et al., 2004). The first mechanism is the relationship with characters. If a reader likes or identifies with

a specific character, the events experienced by the character or statements made by the character may have a greater effect in shifting the reader's beliefs (Green, 2006).

Transportation may also elicit belief changes by lowering resistance to the messages in the narrative. Resistance, defined as a reaction against change or a motivation to oppose persuasive appeals, is a key barrier to changing attitudes and behaviors (Knowles & Linn, 2004). Narratives may be particularly effective at overcoming resistance as narrative evidence has been found to be more effective than fact-based evidence, particularly when messages are not similar to one's own beliefs (Slater & Rouner, 1996).

A third potential mechanism of transportation is coherence, in which a story is logical and consistent. Researchers are learning that readers have different expectations of a narrative depending on its storyline or genre (Green, 2008). While a biography may be expected to have realistic events, a science fiction narrative may be expected to have more fantastic events. Thus, a consistent and logical story that meets the expectations of a reader may result in more positive responses to the story's messages.

Images have also been frequently used in health communication. TIM suggests that these images are most impactful when they are embedded in a story, rather than provided in isolation (Green & Brock, 2002), thus visual images relevant to the story's messages, such as those incorporated in Manga comics, may further impact attitudes and beliefs.

Social cognitive theory (SCT), which is the most common theory used in effective dietary behavior change interventions for youth (Lytle & Achterberg, 1995) also lends explanation to ways in which Manga comics may influence health behavior. Manga

comics can use observational learning to influence health-behavior change. Readers who relate to the characters in the comics and see them as role models may be more likely to perform the health behaviors which they model. The development of entertainment-education narratives draws greatly on SCT by using role models to perform new behaviors, which aim to improve outcome expectancies, outcome expectations, behavioral capability and self-efficacy related to the intended behavior (Baranowski, Perry, & Parcel, 2002).

As narrative approaches emerge as promising tools for motivating and supporting health-behavior change, a Manga comic with health messages guided by the TIM, the SCT and formative research, may be an effective vehicle to convey health messages. Thus, we hypothesized that youth reading a Manga comic promoting fruit consumption would have higher outcome expectations, self-efficacy and knowledge related to fruit intake than youth reading a newsletter about fruit or youth in a Control group.

VI.C. Methods

Participants.

All students enrolled in two central North Carolina public middle schools were eligible to participate in the study; there were no specific exclusion criteria. The two school districts, in which the study was conducted, have greater percentages of children eligible for free or reduced-priced lunches than the national average; the national average is 41.2% (U.S. Department of Education, 2007), while the percentage for the two school districts were 53.8% and 56.2%, respectively (The Annie E. Casey Foundation, 2008). Approval from the school districts and Public Health-Nursing IRB at the University of North Carolina at Chapel Hill were received. Parental consent and student assent were

obtained for this study. Participants received small gifts (e.g., stationary, school supplies, water bottles) valued at $5 upon completion of the intervention.

Study Design.

A three-group, randomized single-session study was conducted. Each participant was randomly assigned to one of three groups: Comic, Newsletter or Attention-Control group.

The **Comic** group received *Fight for Your Right to Fruit* comic (Appendix G). This comic was 30 pages and 99 picture panels, with the cover printed in color and other pages printed in black and white. The main character of the Comic is Kenzo, a seemingly average 15-year old male, who attends a local high school and enjoys playing soccer. He eventually discovers that he has a destiny to save the world by battling an evil Empire that starves its people of fresh fruits. The primary components through which transportation and the SCT theoretical constructs were conveyed included the storyline, characters, graphics and text. The last page of the comic was "A Note from Kenzo" where additional information about the benefits of fruit was included. The information in the Note was presented in a similar format as the Nutrition newsletter. The comic, including the Note from the main character and introduction, was a total of 1,570 words. Figure 6.1 displays the front cover of the comic and figure 6.2 shows a conceptual model of the Manga Comic with a theoretical framework explaining how it may influence psychosocial constructs and, ultimately, behavior related to obesity prevention. Development of the Comic was informed by focus groups conducted with the target population during the formative phase of this study. Details of the formative research have been published elsewhere (Leung et al., under review).

The **Newsletter** group received a five-page newsletter (Appendix H), which included information about fruit, such as tips to promote fruit consumption, health benefits of eating fruit, nutrient information, fun facts and description of a sapodilla, with which most youth would be unfamiliar (named the "Funky Fruit"). The newsletter also included a word search puzzle with names of fruits. The first page of the newsletter was printed in color, while the other four pages were black and white. The newsletter was a total of 741 words. A character named Kenzo, a male high school sophomore and a member of the school's soccer team, introduced the newsletter, to maintain consistency of the main character across the groups. Figure 6.3 displays the front page of the nutrition newsletter.

The **Attention-Control** group received a five-page newsletter (Appendix I), which included information about Ancient Greece and a word search puzzle related to Ancient Greece and Greek Mythology. The first page of the newsletter was printed in color, while the other four pages were black and white. The newsletter was a total of 874 words. A character named Kenzo, a male high school sophomore, introduced the newsletter.

Data Collection.

Data collection occurred during school hours. During Day 1, participants completed a demographics survey and the baseline psycho-social questionnaire (Appendix M). During Day 2 (four to six days after Day 1 depending upon school schedules), the teacher who was supervising the class randomly assigned the students to one of three groups by distributing a colored folder to each of the students. The colors represented the group to which the students were assigned. Upon assignment, the

participants were directed to either a specific classroom or area of gym for their assigned group. Once in their assigned groups, standard instructions were given to the groups and then the students were told to open up their folders, which contained their reading material. Upon finishing their reading material, the students raised their hands to signal their completion. The researcher then handed the student their post-test questionnaire (Appendix N) and removed the reading assignment. Figure 6.4 shows the data collection process across the three days.

Measures and Instrumentation.

Primary outcome measures included outcome expectations, self efficacy and knowledge, which were measured at baseline (on Day 1) and immediately after reading (on Day 2). Behavior change was not assessed due to the study design of only immediate follow up. Outcome expectations for fruit consumption were measured with two items (alpha=0.72): *Eating fruit everyday makes me feel good* and *Eating fruit everyday gives me more energy* (De Bourdeaudhuij et al., 2005). Two items were included to measure self-efficacy for fruit consumption: *If I decide to eat fruit every day, I can do it* and *It is difficult for me to eat fruit every day* (De Bourdeaudhuij et al., 2005). However, due to poor inter-item correlation (alpha= 0.36), perhaps because the latter item was reverse-coded, we chose to measure self-efficacy with a single item: *If I decide to eat fruit every day, I can do it*. Knowledge about fruit and fruit consumption was measured with seven items. All items were rated on a five-point scale ranging from *Strongly Disagree* (1) to *Strongly Agree* (5).

Secondary outcome measures included transportation, enjoyment, and engagement, measured at post-test. The Transportation scale is intended to capture the

major dimensions of 'transportation' such as emotional involvement, cognitive attention, feelings of suspense, lack of awareness of surroundings and mental imagery (Green & Brock, 2000). The scale included 11 general items and one imagery item related to the main character (alpha=0.70). Examples of transportation items include *After finishing the comic/newsletter, I found it easy to put it out of my mind*; *I was more interested in what my classmates were doing than reading the comic/newsletter* and *While reading the comic/newsletter, I had a vivid image of Kenzo*. All items were measured on a five-point scale ranging from *Not At All* (1) to *A Lot* (5). The original Transportation scale was adapted for the intended population following pilot testing with a small group of youth (Green & Brock, 2000).

Enjoyment of the reading materials was measured with two items: *I had a good time reading the comic/newsletter* and *The comic/newsletter was entertaining* (alpha= 0.91). The items were rated on a five-point scale ranging from *Not At All* (1) to *A Lot* (5). Engagement was measured by the amount of time the student spent reading their assigned materials, with more time meaning greater engagement (Berliner, 1990). The time began when the students were asked to open their folders to begin reading their materials and ended when they raised their hand to represent they had finished reading and were ready to complete the post-test questionnaire. The students were not told that reading time would be measured to prevent biased reading times.

Statistical Analysis.

All analyses were conducted using STATA, version 9.1. Statistical analyses were performed to compare the Comic group to the Attention-Control and Newsletter groups with respect to demographic characteristics and primary outcome variables at baseline.

Regression analyses were also used to test for difference in baseline demographic characteristics between subjects with and without missing data ($\geq$ 10%).

To determine change in primary outcomes for the Comic group compared to the other two study groups, ordinary least squares regression models were applied. For all models, the baseline value of the dependent variable was included, in addition to controlling for gender, age and engagement. Backwards elimination procedure was used to determine which covariates should be included in the final model. To test for possible moderation of treatment effect by age, gender, ethnicity, dietary behavior, physical activity behavior or manga reader status, the demographic term and a group x demographic interaction term were added. We explored within group changes using paired t-test.

The effect of the intervention on secondary outcomes were examined using ordinary least squares regression models. A Bonferroni correction was conducted to account for the multiple comparisons across study groups, with a significance level of <.025.

Post-Intervention Evaluation.

Following the conclusion of the study, five semi-structured focus group discussions were conducted with a random sample of the Comic group participants to gain a better understanding of the acceptance, comprehension and perceived impact of the Manga comic. The discussion guide (Appendix O) consisted of open-ended questions, probes and follow-up questions that gauged participants' initial reactions, likes and dislikes, comprehension and relevance of the intended health messages in the Manga comic. Each group discussion lasted approximately 30 minutes. All discussions were

audio taped and transcribed verbatim. Transcripts were reviewed for accuracy and completeness against the audiotapes. Analysis included an inductive process whereby we looked for patterns in our data to identify emerging themes. A codebook was developed upon initial review of the data and additional codes were added to capture themes from specific questions as analysis continued. Upon completion of coding, similar codes were collapsed together to identify main themes. Atlas.Ti, a software program designed to analyze text-based data, was used to code the transcripts. The coding reports were then summarized by the principal investigator.

VI.D. Results

Participants.

Participant characteristics at baseline are shown in Table 6.1. There were no significant differences between the Comic group and either the Newsletter or Control groups. Mean age of participants were approximately 13 years with a range of 9.85 to 17.98 years. Despite random assignment at the individual level, there were more males in the Control group than the other two groups; the difference in gender distribution was significant between the Newsletter and Attention-Control groups ($p=0.01$), however, comparisons were not made between these two groups. Approximately 40% and 30% of participants were Black/African-American and White, respectively, while the majority of participants were in the sixth grade. Approximately half of the participants reported consuming five or more servings of fruits and vegetables/day in the past seven days, while about 60% reported having been physically active for at least 60 minutes for five or more days in the past seven days. Over two-thirds of the participants had read at least one Manga comic.

Table 6.2 outlines the changes in outcome expectations, self-efficacy and knowledge within each group. Participants in the Comic group tended ($p=0.03$) to have an increase in outcome expectations (0.44 ± 1.64) compared to the Control group ($-.24\pm1.81$). No differences were observed between the intervention and other two groups in self-efficacy or knowledge related to fruit consumption. There was also no evidence of moderation by age, gender, race, fruit/vegetable intake, physical activity behavior and Manga reading status. Significant within-group changes in outcome expectations and knowledge were observed in both the Comic ($p=0.02$ and $p=0.04$, respectively) and Newsletter group ($p=<0.01$ and $p=<0.001$, respectively). No significant changes were found in the Control group.

Table 6.3 shows the results of transportation, enjoyment and engagement within each group. The Comic group was significantly more transported ($p<0.01$) with their media compared to the Newsletter and Control groups. In addition, participants in the Comic group reported enjoying their media more ($p<0.04$) and were more engaged ($p<0.001$) than the other two groups.

Post-Intervention Evaluation.

Twenty-six students (13 male, 13 female) participated in five post-intervention focus group discussions. To determine acceptability of the Manga comic, we asked the participants "Did you think the comic was enjoyable?" The majority of students reported the comic was enjoyable and humorous. Reasons given were that the comic mainly contained pictures instead of words, the graphics were appealing and the storyline was about fruit. Others mentioned that they "related" to some of the characters. While most students did have positive responses to the comic, a few participants who had never read

a Manga comic did find the story confusing and felt the events of the story were too unrealistic.

To evaluate comprehension, we asked "What do you think the main message was?" The students provided several answers related to fruit and health, which included that consuming fruit was good for the body because it kept one healthy and provided energy. Other messages mentioned included that youth should eat more fruit and eating junk food and sweets is unhealthy. The participants picked up these messages through the main character's actions, such as Kenzo eating fruit, Kenzo being able to kick a soccer ball like a professional because of the energy he obtained from the consumed fruit, and his friends becoming unhealthy when they only consumed junk food as they did not have access to fruit. The students also recalled information about how much fruit one should eat on a daily basis and that juice drinks do not count as fruit. All the students concurred that the story's messages were important.

"...I got the message it was trying to say. 'Cuz like without fruit, the world is like lazy and everybody was lazy and fat and ate junk food and with fruit you get a lotta energy boosters..." (6th grade male)

"Too much junk and not enough fruit will hurt. I think [the message] is good because fruit can keep you from getting sick." (6th grade male)

To evaluate perceived impact, we asked "Did this comic make you want to do anything?" After reading the comic, the majority of students reported feeling like they wanted to eat more fruit. It motivated a few to say they would try to eat fruit that they did not necessarily eat much of, or to try completely new fruit. A few students also said they felt like being more physically active.

"Readin' the story kinda inspired me to do better. Like eat more fruits and vegetables." (8th grade female)

VI.E. Discussion

As childhood obesity rates continue to rise there is a need for designing effective obesity prevention programs that are engaging for youth. The current study aimed to develop an intervention tool by incorporating positive health messages into a popular form of media for the targeted age group. The Manga comic intervention tended to result in positive changes in outcome expectations in the Comic group compared to the Control group. Both the Comic and Newsletter groups had increased outcome expectations and knowledge. Outcome expectations have been found to be associated with fruit and vegetable behaviors in previous studies as people are more likely to perform a behavior if the behavior is associated with positive outcomes (Domel et al., 1996; Moser, Green, Weber, & Doyle, 2005; Resnicow et al., 1997; Steptoe, Perkins-Porras, Rink, Hilton, & Cappuccio, 2004; Van Duyn et al., 2001). It appears that both the newsletter format and narrative comic were effective in promoting change in outcome expectations, however, no differences were observed in self-efficacy between and within the groups. A single-session design may not have provided sufficient exposure to the health messages to produce observable changes in this SCT construct.

Knowledge improvement, in the Newsletter group, immediately after reading their materials, was not surprising as the format of the newsletter was designed to reflect a traditional mode (fact-based) of presenting information. The improvement in knowledge of the Comic group is promising and further highlights the potential for Manga comics to be used in promoting messages related to fruit consumption, as knowledge has been associated with dietary behavior change in youth (Bere & Klepp, 2004; Kristjansdottir et al., 2006; Reynolds, Hinton, Shewchuck, & Hickey, 1999; Wind

et al., 2006). However, as mentioned previously, the comic did present information in a narrative and fact-based format as entertainment-education research suggests a combination, such as a non-narrative summary recapping the intended persuasive message of a narrative piece, may be necessary for a communication to be successful (Slater & Rouner, 2002). Thus, explicit information was presented as "A Note from Kenzo" at the conclusion of the comic to review information presented in the story; additional information about the health benefits of fruit was included. Therefore, it is difficult to conclude, whether it was a specific component or a combination of the two modes of information delivery, which may have influenced the changes in health beliefs.

The results also showed that those in the Comic group were more transported than the other two groups. Transportation into a narrative world is believed to lead to persuasion of the story's messages, the mechanism of transportation was also incorporated to lead to change in the SCT constructs (Green & Brock, 2002). Moreover, those in the Comic group were more engaged with their reading materials (measured by reading time), which is a proxy measure of how stimulated the students are by the materials (Berliner, 1990). The comic was longer in length than the materials presented to the other groups so results for engagement were not necessarily surprising. However, while the students were encouraged to read all of their material, the amount of time spent on it was completely voluntary. Not only was the Comic group more engaged, they also enjoyed their reading materials more than the other two groups. This suggests that, although there may not have been any major differences in psychosocial outcomes of the Comic compared to the newsletter, a comic format may increase the motivation to pick

up and read such material, highlighting an opportunity to engage youth and promote positive health messages.

A critical component of an effective narrative is a balance between the entertainment and education of the story (Green, 2006). Students of similar age have mentioned that they do not appreciate educational books masquerading as entertainment (Leung, 2010). Ensuring appeal to the health materials is important as appeal can lead to increased engagement and a greater opportunity for the students to respond positively to the story's messages.

The changes observed suggest that the combined theoretical framework of TIM and SCT, by which the comic was informed, represent important aspects of behaviors and thus may provide a unique framework for the design of innovative nutrition promotion programs aimed at youth. In addition, the focus groups conducted with the target population during the formative stage may have further enhanced the appeal and effect of the Comic.

According to data from the post-intervention evaluation, the majority of the Comic group participants enjoyed the graphics and storyline of the Comic and reported that they felt like eating more fruit after reading the comic. Both the quantitative and qualitative results suggest that Manga comics could promote changes in psycho-social variables related to fruit intake. It is likely that the characters to which the participants related and the entertaining aspects maintained engagement in the comic. However, it is not clear, to what extent and how, factors such as an interesting storyline, relatable characters, and appealing graphics, may have resulted in the changes.

There are several limitations of the study which should be noted. Because of the single-session study design, it was not possible to measure dietary outcomes. The comic included both implicit and explicit information thus making it difficult to conclude which components of the comic lead to the belief changes. As in most studies, the generalizability of results is not clear as the study was conducted in central North Carolina. However, the diversity in ethnicities of the participants highlights the potential for Manga comics to be used with various populations, particularly those at greatest risk for obesity.

Manga comics are a popular reading trend for US youth, which positions these comics as an appealing format for promoting positive behavior change in childhood obesity prevention programs. The format can be easily disseminated, either in print format or on the internet, which increases its potential for reach. The graphics and minimal text also make it a promising format for low-literacy populations.

Fight for Your Right to Fruit highlights the potential of Manga comics to promote belief changes related to fruit consumption in middle school youth. Further research is needed to gain a greater understanding related to the key components of the comic that influenced the belief changes. Long-term studies and multiple exposures of health messages through a series of comics should be carried out to determine long-term impact on behavior and finally, additional research should be conducted in other populations to assess the generalizability of comics.

Table 6.1. Participant demographic data at baseline

Group	**Comic**	**Newsletter**	**Control**
n	86	88	89
Age (years; mean±SD)	13.2±1.0	13.2±1.1	13.2±1.3
Gender			
Male	42 (48.8)	36 (40.9)	54 (60.7)
Female	44 (51.2)	52 (59.1)	35 (39.3)
Race			
Black/AA[+]	34 (39.6)	37 (42.1)	39 (43.8)
White	26 (30.2)	29 (33.0)	30 (33.7)
Hispanic/Latino	6 (7.0)	9 (10.2)	8 (9.0)
Other/Mixed	20 (23.3)	13 (14.8)	12 (13.5)
Grade			
6th	38 (44.7)	37 (42.1)	36 (40.9)
7th	30 (35.3)	32 (36.4)	29 (33.0)
8th	17 (20.0)	19 (21.6)	23 (26.1)
F/V Intake[++]			
Yes	35 (43.2)	38 (47.5)	40 (47.6)
No	46 (56.8)	42 (52.5)	44 (52.4)
PA[+++]			
Yes	45 (57.7)	48 (60.8)	54 (65.1)
No	33 (42.3)	31 (39.2)	29 (35.0)
Manga Reader			
Yes	56 (65.1)	66 (75.0)	59 (66.3)
No	30 (34.9)	22 (25.0)	30 (33.7)

Data presented as n (%), unless otherwise indicated

[+]AA represents African-American

[++]F/V Intake defined as consuming fruit/vegetables 5 or more times/day in past 7 days

[+++]PA defined as doing 60 minutes/day of physical activity on 5 or more days in last 7 days

Table 6.2. Change in outcome expectations, self-efficacy and knowledge, by groups

Group	n	Comic	n	Newsletter	n	Control
Outcome expectations[+]	81		80		84	
Baseline		8.15±1.94		7.76±1.96		8.17±1.77
After reading		8.59±1.86		8.36±1.86		7.95±2.11
Change		0.44±1.64		0.59±1.94		-0.24±1.81
p-value				0.98		0.03
Self-efficacy[++]	81		80		84	
Baseline		4.23±1.15		4.01±1.26		4.06±1.30
After reading		4.36±1.06		4.11±1.19		4.23±1.25
Change		0.12±1.17		0.10±1.37		0.17±1.45
p-value				0.11		0.20
Knowledge[++]	81		80		84	
Baseline		3.10±0.43		3.11±0.42		3.07±0.38
After reading		3.29±0.62		3.37±0.55		3.15±0.46
Change		0.18±0.68		0.26±0.55		0.08±0.58
p-value				0.76		0.67

All data are mean±SD
n varied due to missing data
Adjusted for baseline values, age, gender and engagement
p-value for difference in change compared to Comic group
[+]Possible score range=2-10
[++]Possible score range=1-5

Table 6.3. Mean values of transportation, enjoyment and engagement, by group

Group	Comic	Newsletter	Control
Transportation[+]	3.05 ± 0.68	2.78 ± 0.51	2.55 ± 0.57
p-value		<0.01	<0.001
Enjoy score[+]	7.07±2.81	5.98±2.57	6.17±2.43
p-value		<0.01	0.03
Engagement (mins)	15.66 ± 4.34	10.07 ± 3.30	11.80 ± 4.48
p-value		<0.001	<0.001

All data are mean±SD
p-value compared to Comic group
[+]Possible score range=1-5
[++]Possible score range=2-10

Figure 6.1. Front cover of the developed Manga Comic-*Zen'Aku: Fight for Your Right to Fruit!*©

Figure 6.2. Conceptual model of the Manga Comic with a theoretical framework explaining how it may influence SCT constructs and, ultimately, obesity-prevention behaviors

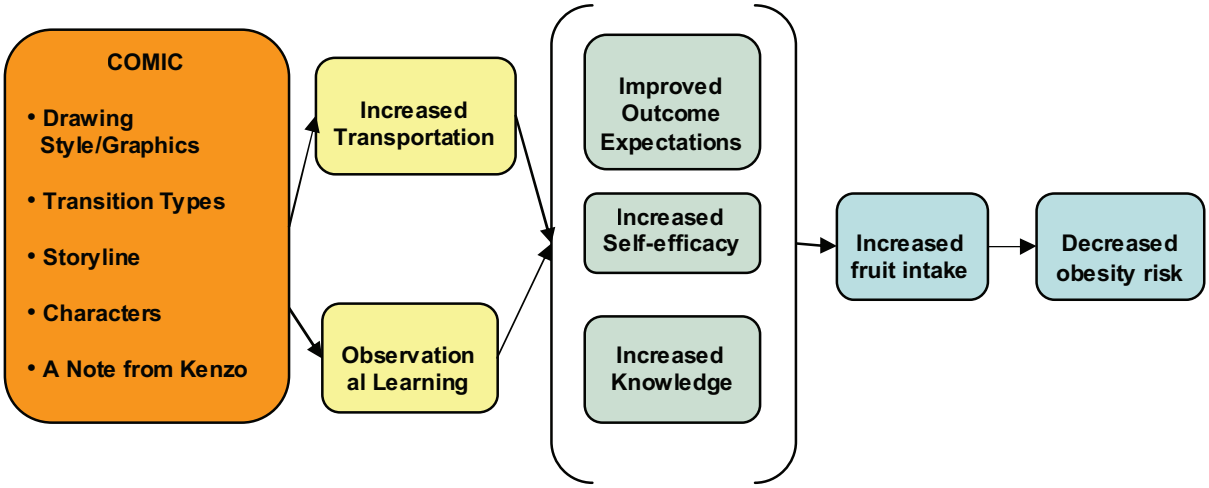


Figure 6.3. Front page of the Nutrition Newsletter

Meet Kenzo:

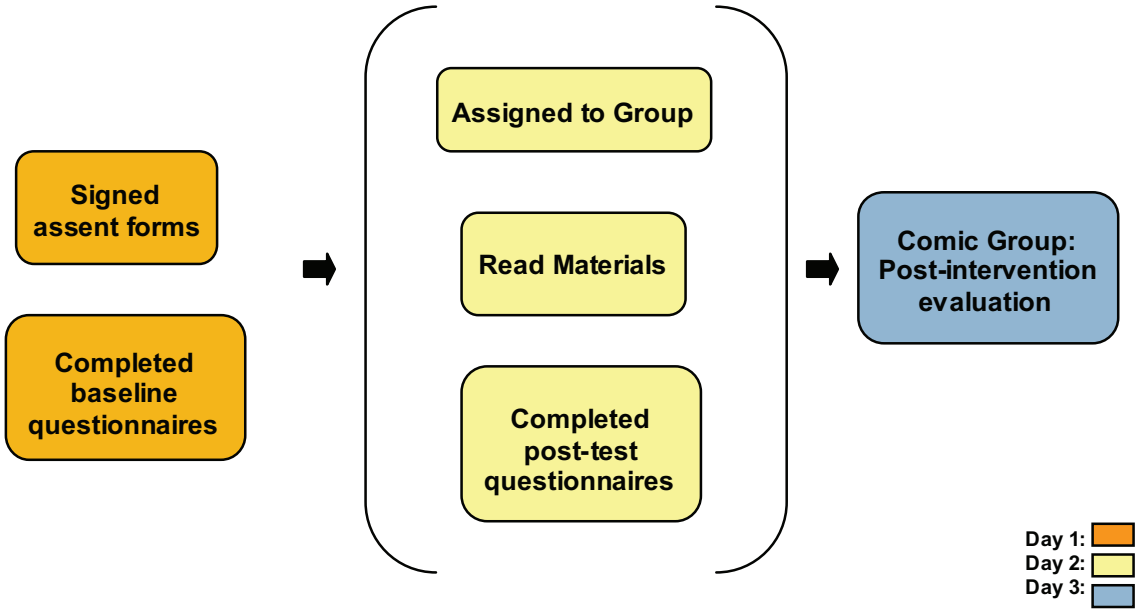
Hi! My name is Kenzo. I'm a sophmore in high school and a member of the school's soccer team. 90 minutes of running and making quick decisions is nothing to laugh at. Every little bit of energy is a plus and eating the right types of foods, such as fruits, makes things a lot easier. I've learned some interesting information about fruit and wanted to share some of it with you. Enjoy!

-Kenzo

Benefits of Eating Fruits:

- Fruits have different vitamins, like A & C, and minerals, like calcium and potassium. This all provides energy and promotes strong bones and a healthy body.
- Fruits have fiber, which keeps the body in balance and healthy.
- Fruits contain "phytochemicals". It's pronounced "FIGHT-O-CHEMICALS". Phytochemicals give fruits and vegetables their bright colors. They work with vitamins and minerals to keep bodies healthy.
- Eating colorful fruits every day will increase phytochemical levels. The stronger the color, the better the benefit. Deep colored fruits have some of the best benefits.

Figure 6.4. Data collection process



CHAPTER VII

SUMMARY AND RECOMMENDATIONS

VII.A. Summary of findings

The results of this dissertation suggest that Manga comics may be a promising way to reach youth in an engaging and appealing environment, however it has yet to be determined, if nutrition education in this format could result in behavior change. While the development of such media may initially incur costs and require time and resources, Manga comics may provide the catalyst to engage youth and can be easily disseminated in various settings. Additionally, its format of minimal text and visual graphics make it accessible to low literacy populations. The information presented in this dissertation contributes to the understanding of using an innovative media to promote health messages in youth in multiple ways by: (1) providing information about nutrition and physical activity (PA)-related messages in popular youth Manga comics, (2) understanding what Manga comic components and health topics appeal to youth and could be included in a new intervention tool using Manga comics, and (3) evaluating the impact of a theory-informed, evidence-based Manga comic on psychosocial variables related to fruit intake in middle-school youth.

In the first aim, found in chapter four, a content analysis was conducted on eight popular youth Manga comics. The findings suggest that obesity-related messages are prevalent in Manga comics as a broad range of nutrition and PA-related content was identified. Additionally, the polarity of the messages did vary-some content was positive,

however many (particularly nutrition-related messages in *Shojo* comics) were negative as they promoted the consumption of high energy-dense foods. This study also collected information on the comic characters who were modeling the obesity-related behaviors. It appeared there were no clear differences in demographics and personality traits of comic characters portraying positive or negative behaviors. To the best of our knowledge, there has been no previous research which examined the obesity-related content/behaviors in youth Manga comics. These findings suggest that the health messages incorporated into the Manga comics could be improved to promote more positive health messages.

In the second aim, found in chapter five, we conducted further formative research through focus groups with middle-school youth to inform the development of our *Healthy Manga* comic. We learned what specific components of Manga comics are enjoyable to our target population. Furthermore, we identified a specific nutrition behavior we could promote as the majority of participants said that eating fruits and vegetables was the most important nutrition behavior for proper health. In addition, the participants provided various ideas as to how to convey the message in a Manga comic format. The results of this aim helped to enhance the potential effectiveness and appeal of our Manga comic.

In the third aim, found in chapter six, we designed a theory-informed, evidence-based Manga comic promoting fruit intake and evaluated its impact compared to two other groups (Control and Newsletter groups). In a single-session study, participants were randomly assigned to one of the three groups. We assessed outcome expectations, self-efficacy and knowledge related to fruit intake, in addition to secondary measures of transportation, engagement and enjoyment. No significant differences in psychosocial variables were observed when comparing the Comic group to the other two groups.

However, both the Comic and Newsletter group did have significant within-group changes in outcome expectations and knowledge related to fruit intake. The Comic group participants also reported greater transportation, engagement and enjoyment of their media than the other two groups. During post-intervention evaluations, the majority of Comic group participants said they enjoyed the graphics and storyline, understood the main message about fruit and felt like eating more fruit after reading the comic.

VII.B. Theoretical implications

The Manga comic that was developed in Aim 3 was informed by theoretical constructs from the Transportation-Imagery Model (TIM) and Social Cognitive Theory (SCT). While we did not observe any differences in change in SCT constructs between the groups, significant within-group changes in outcome expectations and knowledge related to fruit intake were observed in both the Comic and Newsletter groups, which suggest that a single exposure to a nutrition-related Manga comic has similar impact as a traditional mode of presenting nutrition information. One could then argue that the upfront costs and resources required to develop a Comic may not be worth the additional effort. However, when interpreting the results one must consider whether a single exposure to the messages within the Manga comic was an adequate dose to observe differences in change in psychosocial outcomes. While the hypothesized outcome was not observed, differences in transportation, enjoyment and engagement were observed in the Comic group compared to the other two groups, which suggest that the comic may provide additional benefits and could act as a catalyst to create awareness, promote discussion and encourage positive health behaviors in youth in an informative and engaging environment.

In this study, innovative measures related to cognitive processes (transportation) were collected. Future research should explore the possible association of transportation and SCT constructs, which may further add to the knowledge of how cognitive processes may influence or be associated with key theoretical constructs related to desired behavior changes.

While we may not have observed any differences in change between groups in SCT constructs, the incorporation of theory or a combination of theories provides a framework to design and evaluate innovative nutrition promotion programs aimed at youth. Furthermore, it allows researchers the opportunity to understand what aspects of an intervention may or may not produce desired outcomes, particularly within the environment in which the study was conducted. This randomized, single-session study was conducted in a controlled environment. Thus, one must consider that the constructs related to behavior change may vary depending upon environmental conditions, therefore the psychosocial and cognitive changes observed in this study may not be generalizable to the 'real world' environment. Regardless, this exploration does contribute to our theoretical knowledge base and therefore, allows for the modification and refinement of theoretical models and future intervention frameworks.

VII.C. Recommendations

Aim 1.

Media messages related to childhood obesity have focused mainly on the television and internet. The content analyses conducted for Aim 1 was the first we are aware of to identify and analyze the nutrition and PA-related content/behavior in popular youth Manga comics. The findings suggest that obesity-related messages are prevalent in

Manga comics, while the polarity of the messages did vary-some were positive, while others, particularly nutrition-related messages in *Shojo* comics, were negative. This study also collected information on the comic characters who were modeling the obesity-related behaviors. It appeared there were no clear differences in demographics and personality traits of comic characters portraying the positive and negative behaviors.

While one cannot conclude (in this current study) that Manga comics are influencing children regardless of the polarity of messages, the images presented and narrative format, nonetheless, portray behaviors that are associated with childhood obesity. Furthermore, children may identify with the characters that portrayed both positive and negative behaviors as the characters were of similar age to our target population and displayed desirable personality traits, such as being smart, admirable and powerful, thus in essence, providing contradictory health messages. As Manga comics have become a popular reading trend for many US youth, this may provide a teaching opportunity for parents, teachers and health professionals to discuss with youth the significance and meaning of both the healthy and unhealthy messages. Adults could highlight the benefits or consequences of adopting certain habits and expand on the positive behaviors by using the narrative comic as a medium to provide context or images that may assist in youth learning and adopting more positive health behaviors.

As this is the first content analysis on Manga comics, we recommend that additional research should also be conducted to better understand the context of the behaviors portrayed and how youth themselves actually perceive the messages.

Aim 2.

The focus groups conducted for Aim 2 was an important piece of the formative research resulting in the developed *Manga* comic. Working with the intended target population allowed us to gain a greater understanding of the specific components of Manga comics that may result in greater transportation and which health behaviors would be considered enjoyable for middle-school youth to read about. Furthermore, it provided us with ideas of how to incorporate SCT constructs directly into the narrative storyline. While we aimed to recruit a representative population, participants in this study were mostly sixth-grade males. We also conducted a combination of focus group discussions and in-depth interviews. The in-depth interviews were not intended, however, we were able to take advantage of them to gain greater insight and depth into specific Manga comics and characters. In hindsight, we recommend that researchers conduct a similar study with a combination of focus group discussions and in-depth interviews, however, recruit a broader range of participants. We also included a combination of Manga and non-Manga readers with the aim of developing a Comic that could also appeal to those who never read such comics. We would recommend this broader group of study participants to other researchers as the data collected can ultimately extend the generalizability of the Manga comic intervention tool.

Aim 3.

Our third aim found that a theory-informed, evidence-based Manga comic did not produce significant differences in SCT constructs compared to a Newsletter and Control group. Results did find significant within-group changes in outcome expectations and knowledge related to fruit intake in the Comic and Newsletter groups. Additionally, the

Comic group reported greater transportation, enjoyment and engagement than the other two groups. Behavioral measures were not included in this study as the study design only allowed for immediate follow-up after reading the media. Because this was a single-session study, limited exposure to the intervention occurred. Thus, the participants may not have received adequate exposure to the intervention to produce observable differences between groups. In addition, the measures may not have been sensitive enough to detect subtle differences in change, if any, that a single session may have had on the related psychosocial variables. Cognitive processes were measured by transportation, however additional cognitive processes should be examined as this may be one of many cognitive processes that are affected while one is engaged with a Manga comic. Furthermore, it is not clear, to what extent and how, factors such as an interesting storyline, relatable characters and appealing graphics, may have resulted in the observed changes.

The results of this study suggest that Manga comics may create an entertaining and informative learning environment. However as a complex public health problem, childhood obesity should be addressed at multiple levels and through various avenues. Health-promoting Manga comics could be one component of the many programs and interventions aimed at combating this multifaceted health issue.

VII.D. Future research

This dissertation project suggests several possible areas of future research:

1) Aim 1 consisted of the first content analysis of nutrition and PA-related behaviors portrayed in Manga comics. Future research should expand upon the limited sample size of this study and further explore the differences in nutrition and PA messages

between *Shonen* and *Shojo* comics and differences across the multiple genres that exist in youth Manga comics.

2) Future studies should also examine the context of the health-related behaviors that are depicted in these Manga comics to provide a greater understanding of the messages, both implicit and explicit, that are being conveyed. Furthermore, research should extend beyond content analyses to examine the perceptions of the readers themselves as an inherent problem of content analysis studies is that researchers cannot be sure that the intended population perceives what the researcher perceives.
3) This research raises a question regarding how different populations (e.g., age, ethnicity, literacy status) may respond to health information presented in this unique narrative format. Previous nutrition education curriculums have used animated characters to convey information to younger children, thus perhaps a younger age group may respond more positively to a comic-style education program. Characters in Manga comics are drawn in a simplified manner such that more people from diverse backgrounds are likely to identify with them. While our research did not find any difference in outcomes across ethnicities, additional research with larger populations should confirm these results. The graphics and minimal text of Manga comics make it a promising format for low-literacy populations. Future research should explore how at-risk populations, such as low-literacy populations, respond to health information presented in this format.
4) While the Comic group reported greater transportation, engagement and enjoyment of their media compared to the other two groups, it is not known if these factors may explain the within-group changes in SCT constructs observed. A mediation analysis

should be completed to explore this question of whether transportation mediates the effect of the intervention on related psychosocial variables. In addition, future research should explore if a health-related Manga comic influences other cognitive processes, such as those of the Extended Elaboration Likelihood Model.

5) The comic presented both implicit and explicit information, thus making it difficult to conclude which of its components lead to the belief changes. Future studies should be designed such that the information is separated to understand how the different format or combination of formats may influence beliefs.
6) In this study, the intervention was only a single session. Long-term studies with multiple exposures to similar health messages should also be carried out to examine if information presented in this narrative format could produce behavioral changes and if the effects may be sustainable.
7) This study focused on a single nutrition behavior-fruit consumption. Future research should explore the impact of a Manga comic on other obesity-related behaviors and related psychosocial variables, both from a nutrition and physical activity perspective.
8) When considering public health implications, feasibility of dissemination of a health-related Manga comic in the 'real world' should be considered. While the format can be easily disseminated (either in print format or on the internet) increasing its potential for reach, it is unclear, if given the choice, whether children would be drawn to a health-related Manga comic on a voluntary basis.

In summary, this research has provided insight into the use of Manga comics for promoting nutrition-related messages in middle-school youth. This research prompts us to explore unique and innovative ways that health information can be delivered to the

younger population who is often disengaged and uninterested in health-related topics, such as nutrition and PA. As a popular reading trend for US youth, Manga comics may create an appealing format for promoting positive behavior change in childhood obesity prevention programs. Furthermore, the format can be easily disseminated, increasing its potential for reach and the graphics and minimal text also make it a promising format for low-literacy populations. While this research has provided some insight into how nutrition information can be incorporated into a Manga comic, further research is needed to understand how best to deliver the information effectively in this format.

APPENDIX A

CONTENT ANALYSIS CODEBOOK AND INSTRUCTIONS

Content Analysis Instructions & Codebook

This codebook is designed to help you in the process of coding the selected sample of Manga comics. Each variable is defined based on its use in this study. You are to refer to these definitions and only these definitions while coding the comic books.

Instructions:

This is a study of how nutrition and physical activity content/behavior is presented in Manga comics. Your task is to identify the content/behavior and document them according to the codebook. There are also detailed demographic and trait variables of characters that will be coded.

In this codebook you will find a list of categories for each of the variables. Familiarize yourself with the variables and their categories by reading through the list a few times and asking questions if you do not understand the categories. Remember that these may not be categories that you are most familiar with associated with the variables, so be aware of this.

Coding will be conducted in a two-step process. First, read the entire comic book without recording any data. Then, read each chapter one at a time and code each scene in the chapter containing nutrition and physical activity-related content/behavior. As you find variables, input the appropriate category on the coding instrument. You can stop and review the chapter as needed to ensure that all relevant information is completely and accurately recorded

The basic unit of collection is a scene. A scene change is denoted by a change in the continuity of action or a disruption in character interaction by other characters or events. Each scene containing nutrition and/or physical activity content/behavior will be analyzed. Only code scenes that are related to nutrition and/or physical activity.

Part 1: Comic book Descriptives

Title: Select the title of the comic book.

Page #: List the page number that the scene begins on.

Part 2: Nutrition and Physical Activity Content

Type of Content: List if the content/behavior is nutrition or physical activity

1. **Nutrition**
2. **Physical Activity**

Then, select which types of nutrition or physical activity. Choose all that apply.

Nutrition

- Sugar-sweetened beverages
  - e.g., a character drinking soda, fruits drinks (that are not 100% fruit juice), sports drinks with her friends
- Fruits and vegetables
  - e.g., character eating fruits and/or vegetables
- Breakfast
  - e.g., character mentions that he didn't eat breakfast, which has made him tired
- Restaurants, particularly fast food
  - e.g., a character eating in a restaurant with a friend
- Family meals, in which parents and children eat together
  - e.g., a character mentions that he has to go home to eat dinner with his parents
- Portion sizes
  - e.g., picture depicting a large or small plate of food
- Calcium-rich foods
  - e.g., a character drinks dairy products or eats dark green vegetables to have strong bones
- Foods high in fiber
  - e.g, a character eats whole grain foods, fruits & vegetables to lower her risk of heart disease
- Diet with balanced macronutrients
  - e.g., a character talks about eating a balanced diet of carbohydrates, protein and fat to help maintain her weight
- Breastfeeding
  - e.g., a character is embarrassed to breastfeed in public because of social norms
- High energy-dense foods
  - e.g., a character eats high fat foods, such as candy, ice cream, fried foods, then doesn't feel well
- Other: Please describe

Physical Activity

- Television and other screen time (e.g., a character is playing on the computer, video games, watching movies with his friends)
- Moderate to vigorous physical activity
  -_Moderate physical activity_*: exercising but not pushing or exerting yourself. Your heart is beating, breathing increases, but you won't break a sweat.*
  -Examples: Brisk walking, hiking, riding a bike on level terrain and shooting a few baskets
  -_Vigorous physical activity_*: your heart is beating fast, there is a large increase in breathing (conversation is difficult or broken) and you sweat.*
  -Examples: jogging or running, riding your bike uphill and playing a high speed game of basketball
- Active transportation (e.g., a character walks or rides her bicycle to school)
- Other: Please describe

Representation Method: Select the way in which the content/behavior is represented. Choose all that apply.

1. **Pictorial:** The content/behavior is depicted in the pictures.
2. **Verbal:** The content/behavior is spoken by the character to another character.
3. **Thought:** The content/behavior is expressed as a thought by the character.
4. **Other:** Please describe

Length of Scene: Count and document the number of frames/panels of the nutrition or physical activity related content/behavior scene.

Proportion: Document the number of frames/panels within the scene that depict nutrition or physical activity-related content/behavior. This depiction can be pictorial, verbal, or as a thought.

Positive or Negative: Document if the nutrition or physical activity related content is either positive or negative. Positive means a recommended content/behavior, while negative means a not recommended content/behavior. Refer to Expert Committee's recommended/suggested targeted behaviors to reduce risk of childhood obesity (on next page) to determine what is considered a positive or negative content/behavior.

1. **Positive**
2. **Negative**
3. **Neutral**

Direct or Background: Document if the nutrition or physical activity related content (NPC) is direct or background. Direct NPC is defined as an overt action directly related to the main point of the scene whereas background NPC is a nutrition or physical activity-related action that occurred during the scene, but not needed to support the scene. For example, a scene involving a character discussing the advantages of exercising or ordering an alcoholic drink will be categorized as direct. A scene involving a character walking down the street discussing a non-health issue will be categorized as background. The walking down a street provided the background for the scene's plot to unfold; the plot could have been set against many other backgrounds, including those unrelated to health.

1. **Direct**
2. **Background**

Setting: Document the primary setting of the nutrition or physical activity-related content/behavior.

1. **Home**
2. **School**
3. **Work**
4. **Outdoors**
5. **Health-care setting**
6. **Mixed:** Scene occurs in more than 1 setting
7. **Other:** Please describe

Context: If the content/behavior is "direct", then describe the context in which the content/behavior is present. For example, a character may have used martial arts skills to capture a 'bad' character.

Expert Committee's targeted behaviors to prevent childhood obesity

Recommended	Suggested
Dietary	
Limiting consumption of sugar-sweetened beverages	Eating a diet rich in calcium
Encouraging consumption of diets with recommended quantities of fruits and vegetables	Eating a diet high in fiber
Eating breakfast daily	Eating a diet with balanced macronutrients
Limiting eating out at restaurants, particularly fast food	Encouraging exclusive breastfeeding to 6 months of age and maintenance of breastfeeding after introduction of solid food to 12 months of age and beyond
Encouraging family meals in which parents and children eat together	Limiting consumption of energy-dense foods
Limiting portion size	
Physical Activity	
Limiting television and other screen time	Promoting moderate to vigorous physical activity for at least 60 minutes

Part 3: Character Traits

Number of Characters: Document the number of characters primarily involved in the nutrition/physical activity content.

1. **1**
2. **2**
3. **3**
4. **More than 3**

If there are 2 or more characters primarily involved, answer Part 3 questions on only 2 main characters.

Name/Description: List the name of the character. If name is unknown, then briefly describe the character.

Type: Document what type of being the character is.

1. **Human-Male**
2. **Human-Female**
3. **Animal**
4. **Other**-Please describe.
9. **Unable to determine**

Social Age: Estimate the stage at which the character operates in his or her interaction with others.

1. **Child:** The individual behaves and speaks as one who is 12 years of age or younger.
2. **Adolescent:** The individual behaves and speaks as one who is 13 to 18 years of age.

3. **Young adult:** The individual behaves and speaks as one who is 19 to 29 years of age.
4. **Mature adult:** The individual behaves and speaks as one who is 30 to 64 years of age.
5. **Elderly:** The individual behaves and speaks as one who is65 years of age.
9. **Unable to determine**

Socioeconomic Status (SES): Report or estimate the character's SES.

1. **Upper or upper middle class:** An individual who is well-to-do or moderately well-to-do; this individual typically is independently wealthy or has a high-level job and is not dependent on his or her weekly or monthly income to live.
2. **Middle class:** An individual who works for a living, has all the necessities and some luxuries, but is dependent on working for his/her livelihood.
3. **Working class or lower class:** An individual who does not have the necessities or life or just barely has the necessities and no luxuries. He or she may be unemployed or on public assistance.
9. **Unable to determine**

Weight: Indicate whether the character is underweight, normal weight or overweight/obese.

1. **Underweight**
2. **Normal weight**
3. **Overweight/Obese**
9. **Unable to determine**

Characteristics: Indicate the appropriate trait for each adjective pair for the character. If the adjective pair does not apply to the situation, select "Not applicable". Select characteristics that represent the character, in general; not specific to each scene.

-Smart/Stupid

1. **Very smart**
2. **Somewhat smart**
3. **Somewhat stupid**
4. **Very stupid**
5. **Not applicable**

-Admirable/Despicable

1. **Very admirable**
2. **Somewhat admirable**
3. **Somewhat despicable**
4. **Very despicable**
5. **Not applicable**

-Powerful/Powerless

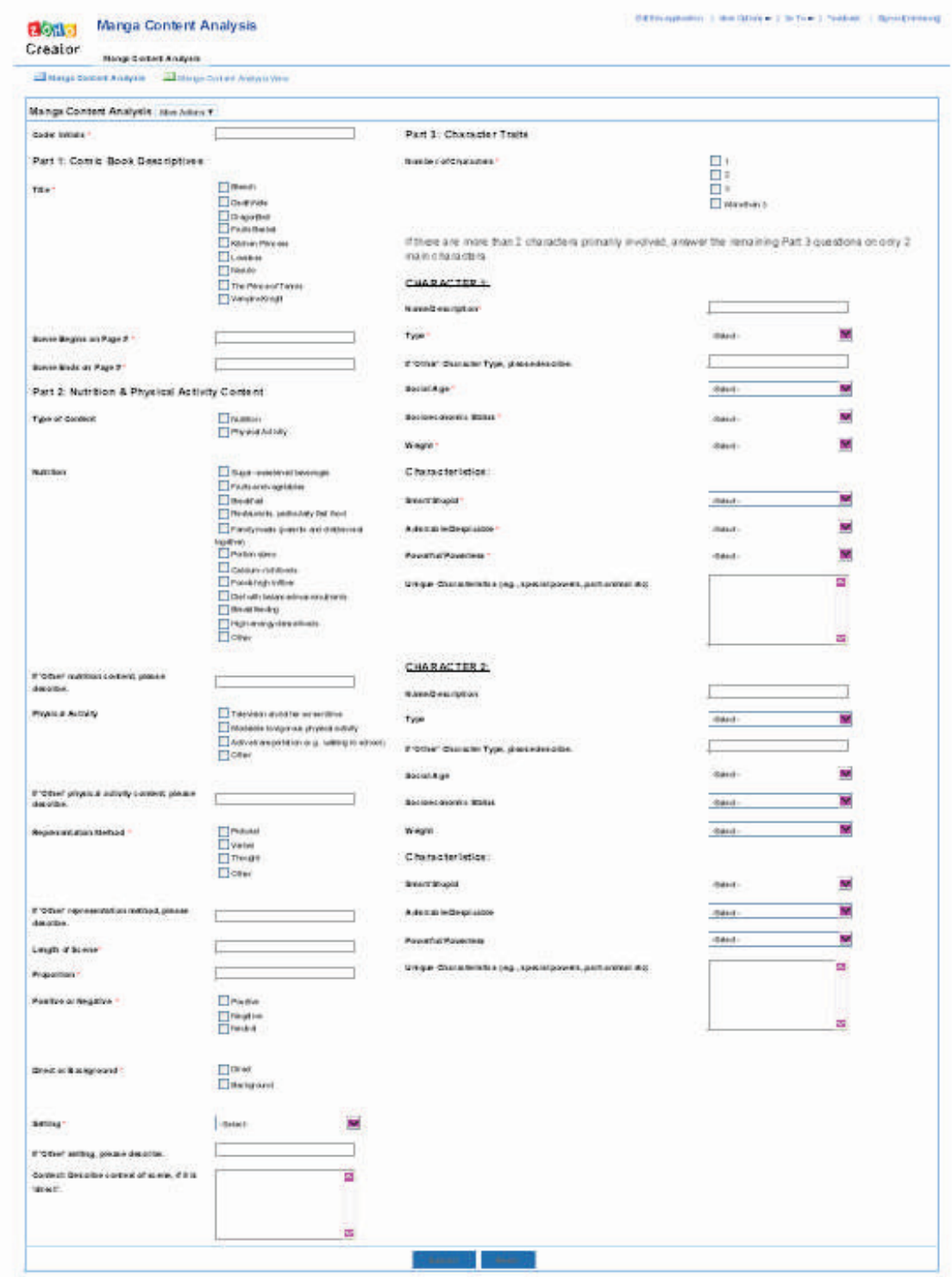
1. **Very powerful**
2. **Somewhat powerful**
3. **Somewhat powerless**
4. **Very powerless**
5. **Not applicable**

*Power can be defined socially (e.g., money), physically (e.g., muscular strength), and/or supernatural (e.g., magical). Please clarify how you define power in the **unique characteristics** box.

Unique characteristics: Indicate if the character has any unique characteristics (e.g., special powers, part animal). Please describe.

APPENDIX B

CONTENT ANALYSIS DATABASE INPUT SHEET



APPENDIX C

AIM 2 PARENTAL CONSENT FORM

University of North Carolina-Chapel Hill
Parental Permission for a Minor Child to Participate in a Research Study

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IRB Study #08-1627
Consent Form Version Date: January 11, 2009

Title of Study: Impact of a Manga comic with health messages on nutrition and physical activity beliefs

Principal Investigator: May May Leung, MS, RD
UNC-Chapel Hill Department: Nutrition, School of Public Health
UNC-Chapel Hill Phone number: 919.843.9466
Email Address: mmleung@unc.edu
Faculty Advisor: Alice Ammerman, DrPH, RD

Study Contact telephone number: 919.843.9466
Study Contact email: mmleung@unc.edu

What are some general things you should know about research studies?
You are being asked to allow your child to take part in a research study. To join the study is voluntary. You may refuse to give permission, or you may withdraw your permission for your child to be in the study, for any reason. Even if you give your permission, your child can decide not to be in the study or to leave the study early.

Research studies are designed to obtain new knowledge. This new information may help people in the future. Your child may not receive any direct benefit from being in the research study. There also may be risks to being in research studies.

Details about this study are discussed below. It is important that you understand this information so that you and your child can make an informed choice about being in this research study.
You will be given a copy of this permission form. You and your child should ask the researcher named above, any questions you have about this study at any time.

What is the purpose of this study?
The purpose of this research study is to understand how different forms of health communication material can influence how middle school students think about nutrition and physical activity. We will use this information to help development effective health communication materials to improve middle school students' thoughts and behaviors related

to nutrition and physical activity.

Are there any reasons your child should not be in this study?
Your child should not be in this study if he/she is not familiar with Manga comics or hasn't read or looked at a Manga comic within the past year.

How many people will take part in this study?
If your child is in this study, your child will be one of about 50 other middle school students to participate in this research project.

How long will your child's part in this study last?
If your child is in this study, we will ask your child to come to school for one group discussion. The group discussion will last about 60 minutes and will occur during the after-school program. There will be about 6 people in the group discussion. The participants will be of similar age as your child. During the discussion, questions related to Manga comics will be asked. The researcher is interested in understanding what makes a Manga comic enjoyable for people your child's age and what storylines and Manga characters your child likes the most. Your child does not have to answer any questions he/she doesn't want to and can stop participation in the discussion whenever s/he wants.
Once the group discussion is over, your child's participation in the study is complete. There is no follow up.

What will happen if your child takes part in the study?
If your child takes part in the study, he/she will be asked to attend one group discussion. The group discussion will be audiotaped with permission from your child. Your child has the right to to ask for the recording to be stopped or to say something without it being recorded. The main topics of the discussion will include which Manga storylines and characters the students prefer to read about, what aspects of the comics make it enjoyable for them, and what ideas/concepts related to nutrition and physical activity youth would like to see in a health-related Manga.

What are the possible benefits from being in this study?
Research is designed to benefit society by gaining new knowledge. You may also expect your child to benefit by being in this study by enjoying talking about favorite Manga comics with their classmates. Also, talking about health-related concepts may increase their motivation to eat more healthily and/or be more physically active.

What are the possible risks or discomforts involved from being in this study?
Researchers are required to explain any possible problems that their study might cause. It is very unlikely that this study will cause any problems for your child as there are no known risks for being in this study. There may be uncommon or previously unknown risks. You should report any problems to the researcher.

We will emphasize to all participants that comments made during the focus group session should be kept confidential. Participants will be discussing personal opinions and thoughts, which may carry some emotional distress or embarrassment for some students. Participants

do not have to answer any questions they don't want to and can leave the group at any time.

How will your child's privacy be protected?
We will also do everything possible to protect your child's privacy. During the group discussion, confidentiality within the group will be stressed and each individual within the group must agree not to share specific discussion details with those outside the group discussion sessions.

Your child's name will not appear on any study documents, instead a code number will be given to your child, which will be used in study documents to protect the confidentiality of your child's name and prevent linking of data to participants. The list which matches names and code numbers will be kept in a locked file cabinet. Your child does not need to reveal her/his true name, if they do not want to. He/she may use a fictitious name.

All hard-copy data and records will be kept in a secure location under lock and key in the Principal Investigator's office and following the transcription of audio taped recordings, all tapes will be destroyed. Any electronic files related to the research study will be uploaded onto a password-protected computer only accessible to the UNC researcher.

Participants will not be identified in any report or publication about this study. Although every effort will be made to keep research records private, there may be times when federal or state law requires the disclosure of such records, including personal information. This is very unlikely, but if disclosure is ever required, UNC-Chapel Hill will take steps allowable by law to protect the privacy of personal information. In some cases, your child's information in this research study could be reviewed by representatives of the University, research sponsors, or government agencies for purposes such as quality control or safety.

Will your child receive anything for being in this study?
At the end of the study, your child will choose either a $5 gift certificate to the local University of North Carolina bookstore or Amazon.com (whichever your child prefers) for taking part in this study.

Will it cost you anything for your child to be in this study?
There will be no costs for being in the study other than your child's time and any travel costs involved in attending the group discussion at school.

What if you or your child has questions about this study?
You and your child have the right to ask, and have answered, any questions you may have about this research. If you have questions, or concerns, you should contact the researchers listed on the first page of this form.

What if you or your child has questions about your child's rights as a research participant?
All research on human volunteers is reviewed by a committee that works to protect your child's rights and welfare. If you or your child has questions or concerns about your child's

rights as a research subject you may contact, anonymously if you wish, the Institutional Review Board at 919-966-3113 or by email to IRB_subjects@unc.edu.

- -

Title of Study: Impact of a Manga comic with health messages on nutrition and physical activity beliefs

Principal Investigator: May May Leung, MS, RD

<u>Parent's Agreement:</u>

I have read the information provided above. I have asked all the questions I have at this time. I voluntarily give permission to allow my child to participate in this research study.

____
Printed Name of Research Participant (Child)

____ _________________
Signature of Parent Date

____
Printed Name of Parent

APPENDIX D

AIM 2 STUDENT ASSENT FORM

University of North Carolina-Chapel Hill
Student Assent to participate in a health project (ages 12-15 years old)

IRB Study #08-1627
Consent Form Version Date: December 12, 2008

Title of Study: Impact of a Manga comic with health messages on nutrition and physical activity beliefs

Person in charge of study: May May Leung, MS, RD
Where they work at UNC-Chapel Hill: Department of Nutrition; School of Public Health

Study contact phone number: 919.843.9466
Study contact Email Address: mmleung@unc.edu

The researcher from the University of North Carolina, Chapel Hill, North Carolina, is conducting a study on how health communication materials affect people your age in the area of health.

These are some things we want you to know about research studies:
Your parent needs to give permission for you to be in this study. You do not have to be in this study if you don't want to, even if your parent has already given permission. You may stop being in the study at any time. If you decide to stop, no one will be angry or upset with you.

Sometimes good things happen to people who take part in studies, and sometimes things we may not like happen. We will tell you more about these things below.

Why are they doing this research study?
The reason for doing this research is to understand how different forms of health communication material can influence how middle school students think about nutrition and physical activity.

Why are you being asked to be in this research study?
Your school agreed to help us with this study.

How many people will take part in this study?
If you decide to be in this study, you will be one of about 50 people in this research study.

What will happen during this study?
If you agree to be in the study, we will ask you to come to school for one group discussion. The group discussion will last about 60 minutes.

There will be about 6 people of similar age in the group discussion. During the discussion, questions related to Manga comics will be asked. The researcher is interested in understanding what makes a Manga comic enjoyable for people like you and what storylines and Manga characters you like the most. You don't have to answer any questions you don't want to and you can stop participation in the discussion whenever you want.

We may tape record the group discussion, if that is okay with you.

Check the line that best matches your choice:
_____ OK to record me during the study
_____ Not OK to record me during the study

You can ask for the recording to be stopped at anytime or to say something without it being recorded.

This study will take place at your school. Once the group discussion is over, your participation in the study is complete. There will be no follow up.

Who will be told the things we learn about you in this study?
We will share what we learn from this project with other people, including other researchers, who want to understand about what people your age think about Manga comics. We may share your thoughts from the discussion with these people, but we will not share your name with anyone.

What are the good things that might happen?
People may have good things happen to them because they are in research studies. These are called "benefits." The benefits to you of being in this study is that you may enjoy talking about your favorite Manga stories and characters with other people your age.

What are the bad things that might happen?
Sometimes things happen to people in research studies that may make them feel bad. These are called "risks." There are no known risks for this study, but like any other discussion you may have with your class, it is possible that you might feel embarrassed about sharing your thoughts about Manga comics. You should tell a member of the research team or your teacher if something is bothering or upsetting you. We want to make sure this project doesn't cause you to feel embarrassed or bad in any way.

Not all of these things may happen to you. None of them may happen or things may happen that the researchers don't know about. You should report any problems to the researcher.

What if you or your parents don't want you to be in this study?
It is your choice to be in the study. If you or your parent don't want you to be in this study, you will not be affected in any way. You can also decide to stop participating at any time during the project.

Will you get any money or gifts for being in this research study?
At the end of the group discussion, you will be able to choose either a $5 gift certificate to the local University of North Carolina bookstore or Amazon.com for taking part in this study.

Who should you ask if you have any questions?
If you have questions you should ask the people listed on the first page of this form. If you have other questions about your rights while you are in this research study you may contact the Institutional Review Board at 919-966-3113 or by email to IRB_subjects@unc.edu.

Title of Study: Impact of a Manga comic with health messages on nutrition and physical activity beliefs

Principal Investigator: May May Leung, MS, RD

If you sign your name below, it means that you agree to take part in this research study.

_____ _____
Sign your name here if you want to be in the study Date

_____
Print your name here if you want to be in the study

_____ _____
Signature of Person Obtaining Assent Date

_____
Printed Name of Person Obtaining Assent

APPENDIX E

AIM 2 PARTICIPANT SURVEY

Date:_____ School:_____
ID#_____

This information collected in this short form will be used only to describe the types of students completing this study.

DO NOT write your name on this form. The answers you give will be kept private. Completing the form is voluntary. If you are not comfortable answering a question, just leave it blank.

Thank you very much for your help.

1. When is your birthday?

Month_____ Day_____ Year_____

2. What is your sex?

A. Female
B. Male

3. What grade are you in?

A. 6th grade
B. 7th grade
C. 8th grade
D. Ungraded or other grade

4. What is your race? (Select one or more responses.)

A. American Indian or Alaska Native
B. Asian
C. Black or African American
D. Hispanic or Latino
E. Native Hawaiian or Other Pacific Islander
F. White

Flip page over to continue form

5. Do you **currently** (meaning within the last month) read Manga comics?

A. Yes
B. No

If you responded **YES**, please continue to the next question.
If you responded **NO**, please move to **Question 8**.

6. How long have you been reading Manga comics?

A. 1 to 6 months
B. More than 6 months to 1 year
C. More than 1 year to 2 years
D. More than 2 years to 3 years
E. More than 3 years

7. How often do you read or look at a Manga comic?

A. Maybe once a year
B. 2 to 5 times a year
C. 6 to 11 times a year
D. Once a month
E. 2 to 4 times a month
F. 5 or more times a month

THANK YOU FOR YOUR HELP. PLEASE HAND THE FORM TO THE PERSON HELPING WITH THE PROJECT.

If you responded **NO** to **Question 5**:

8. When you read Manga comics, how often did you read or look at them?

A. Maybe once a year
B. 2 to 5 times a year
C. 6 to 11 times a year
D. Once a month
E. 2 to 4 times a month
F. 5 or more times a month

THANK YOU FOR YOUR HELP. PLEASE HAND THE FORM TO THE PERSON HELPING WITH THE PROJECT.

APPENDIX F

AIM 2 FOCUS GROUP MODERATOR'S GUIDE

Phase 1: Moderator's Guide

INTRODUCTION

Hi everyone! My name is _____. Thanks again for your help! We really appreciate it! This is the last day of the study. Today we'll be having a discussion. I want to learn more about your favorite movies/books and what things are important to you.

I'd like to tape record the discussion today to make sure I don't miss any of your comments, just because I can't write as fast as you guys talk. If you want to make a comment that you don't want recorded, just tell me and I'll turn it off and re-start it when you finish making your comment.

START RECORDING

*Feel free to share your ideas and opinions even if they are different from others. All opinions and ideas are **very** important. So, let's begin.*

MANGA: (10 minutes)

- If you went into a bookstore, which book would you pick up to read? Why?
- How do you get your Manga comic books?
    - **Prompt**-Share with friends, read on-line, read at the bookstore, purchase, check-out from library
- What do you like about reading Manga comics?
- How do you read Manga comics?
    - **Prompt**-read words first, then look at pictures **OR** look at pictures first
- What stories are your most favorite? Why are those stories your most favorite?
- Which characters are your most favorite? Why are those characters your most favorite?

- Think about your most favorite Manga comic. Is there something you would add to it to make it better?

    - **Prompt**-new character, change something about a current character, setting of the story

NUTRITION (5 minutes)

- When it comes to foods and diet, what do you think is most important to your health?
    - **Prompt**-eating fruits & vegetables, drinking milk, staying away from candy and soda

- How would you convince your friend to eat more fruit?

CONCEPTS/IDEAS: (25 minutes)

- What kind of special power would be the best power to have? Would it be:
    - Brain power (super human intelligence),
    - Magical power (like Harry Potter), OR
    - Physical power (like martial arts power, such as Naruto)

- If you could have one wish for yourself, what would it be?

- What is important to you? What do you care about?

    - **Prompt**-family, doing the right thing, friends

- Is there a story you read or a movie you watched that made you change the way you think of something (or changed your behaviors)?
    - If YES, tell us the story.

- If you were to create a story, who would be the main character?
    - Male or Female
    - How old would the character be?
    - What would he/she look like?
        - height, weight, hair style and color
    - What would his/her personality be like?
        - Popular, soft-spoken, funny
    - Any other characteristics?

* * * * * * *

- Tell me some ideas for a story/comic that would get you to eat more fruit.
    - **Prompt**-a character eats a certain fruit and gets power

Note: Try to get about 5 ideas. Make note of the ideas.

HAVE KIDS CHOOSE THEIR TOP 3 CONCEPTS/IDEAS BY RAISING HANDS

- Explain that of the top 3 ideas they voted on, you're going to ask them some questions about each idea.

- Likes
  - What do you like about the idea? Why?

- Dislikes
  - What, if anything, do you not like about the idea?

- Motivation
  - Does this idea make you want to do anything? If yes, what does it make you want to do?

REPEAT QUESTIONS FOR EACH IDEA

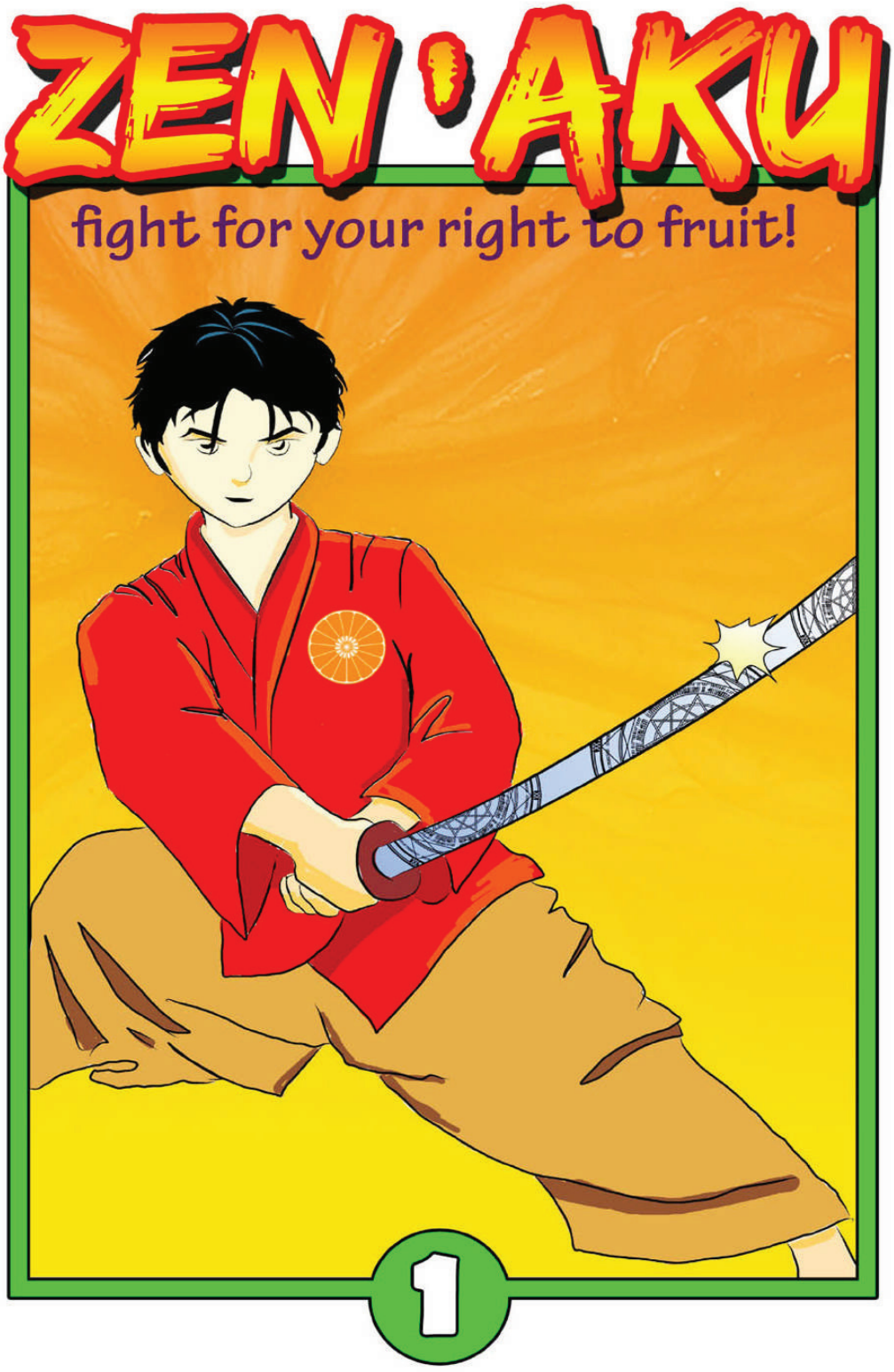
- Preference: Ask each person to vote on which idea they like the best. Recap each concept/idea, VERY BRIEFLY, if needed.
  - Was there one idea that you liked better than the others? (If so, explore reasons why.)

THAT WAS THE LAST QUESTION. YOU GUYS ARE DONE! WE HAVE A LITTLE SOMETHING TO SAY THANKS FOR YOUR HELP.

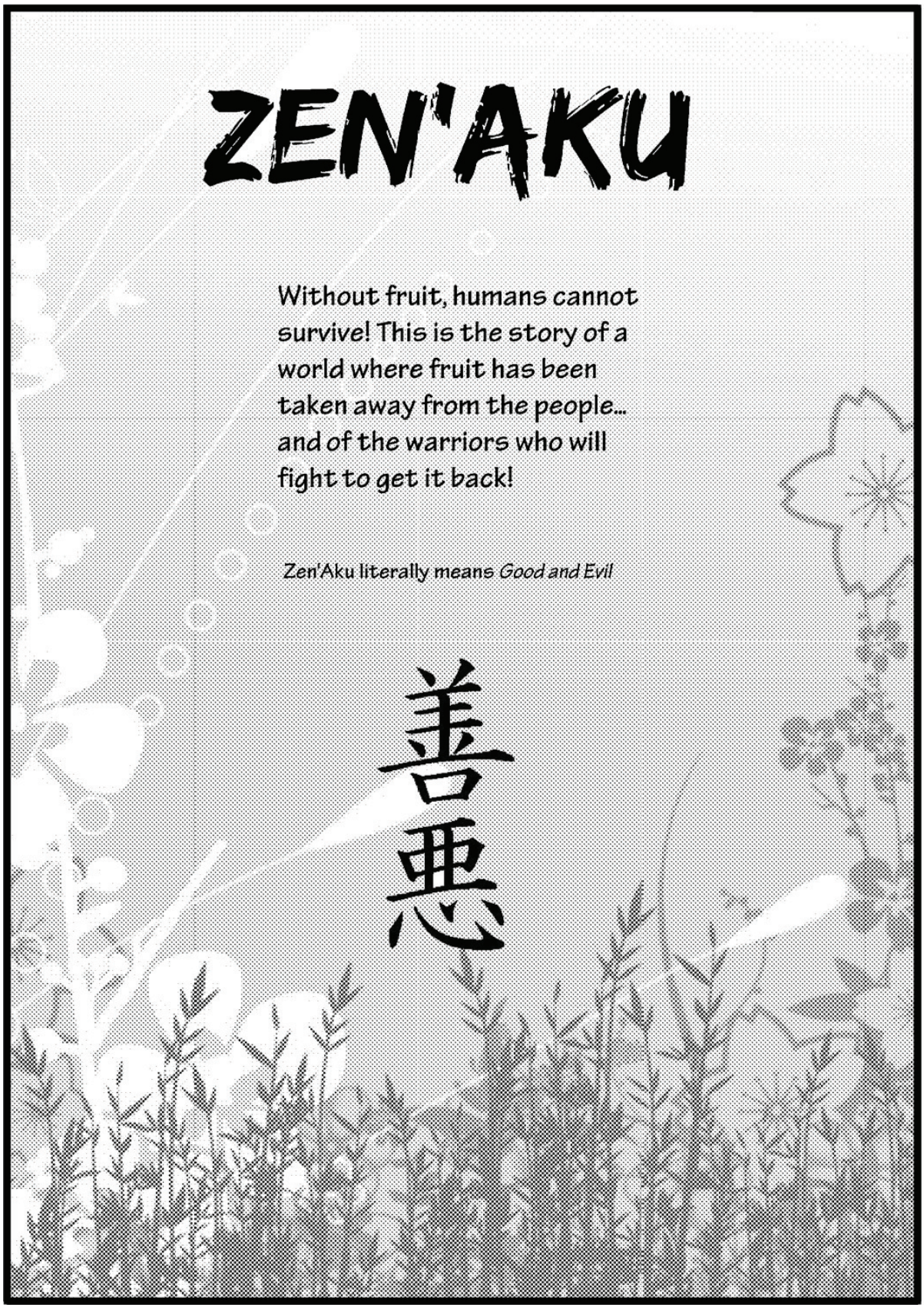
YOU NEED TO FIRST SIGN THE FORM AND THEN COME CHOOSE YOUR GIFTS.

APPENDIX G

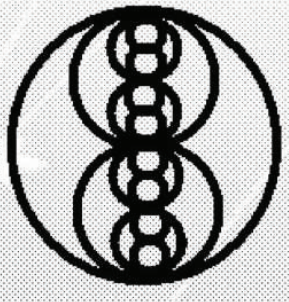
FIGHT FOR YOUR RIGHT TO FRUIT© MANGA COMIC



ZEN'AKU


ZEN'AKU
Without fruit, humans cannot survive! This is the story of a world where fruit has been taken away from the people... and of the warriors who will fight to get it back!
Zen'Aku literally means *Good and Evil*
善悪

WE TRAVEL BETWEEN WORLDS!



When you see this symbol, Kenzo has entered our world Yokon!

YOKON

Yokon is our world, right now, this life, where everyone has freedom and the opportunity to eat fruits... even though not all take advantage of it. But this world is now under threat from the evil mega-corporation Kanagro to take those freedoms away. After conquering Mugen, Yokon is the final battlefront to prevent Kanagro from achieving total domination across both worlds.

When you see this symbol, Kenzo has entered the alternate world Mugen!

MUGEN

Mugen is an alternate world that is identical to our world in all but time... but in Mugen the evil mega-corporation Kanagro has already achieved global dominance by controlling access to fruit and feeding the population only fast foods that sap the strength from their bodies and minds.

BAD GUYS!

KANAGRO

Kanagro is an evil mega-corporation whose influence spans worlds. Their goal is to achieve power over both worlds' populations through a Zero Nutrition policy designed to create unhealthy, weak, and easily controlled people who have lost the will to think for themselves.

WHO'S WHO IN ZEN'AKU

KENZO TACHIBANA

Seemingly average 15 year old male. Likes soccer, attends Katagame 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 Kanagro. Now Yokon Kenzo will have to take up the battle to save both worlds.

BOKU

Mugen Kenzo's sensei taught him to fight Kanagro... but they were defeated in that world.

Now Boku must find Yokon Kenzo and bring out his inner warrior!

NIKI TACHIBANA

Kenzo's cute, 13 year old, very chatty little sister.

But there might be more to her than meets the eye...

WHO'S WHO IN ZEN'AKU

YUJI

15 years old, male. Kenzo's best friend. Awkward but a technical whiz-kid.

JIMO

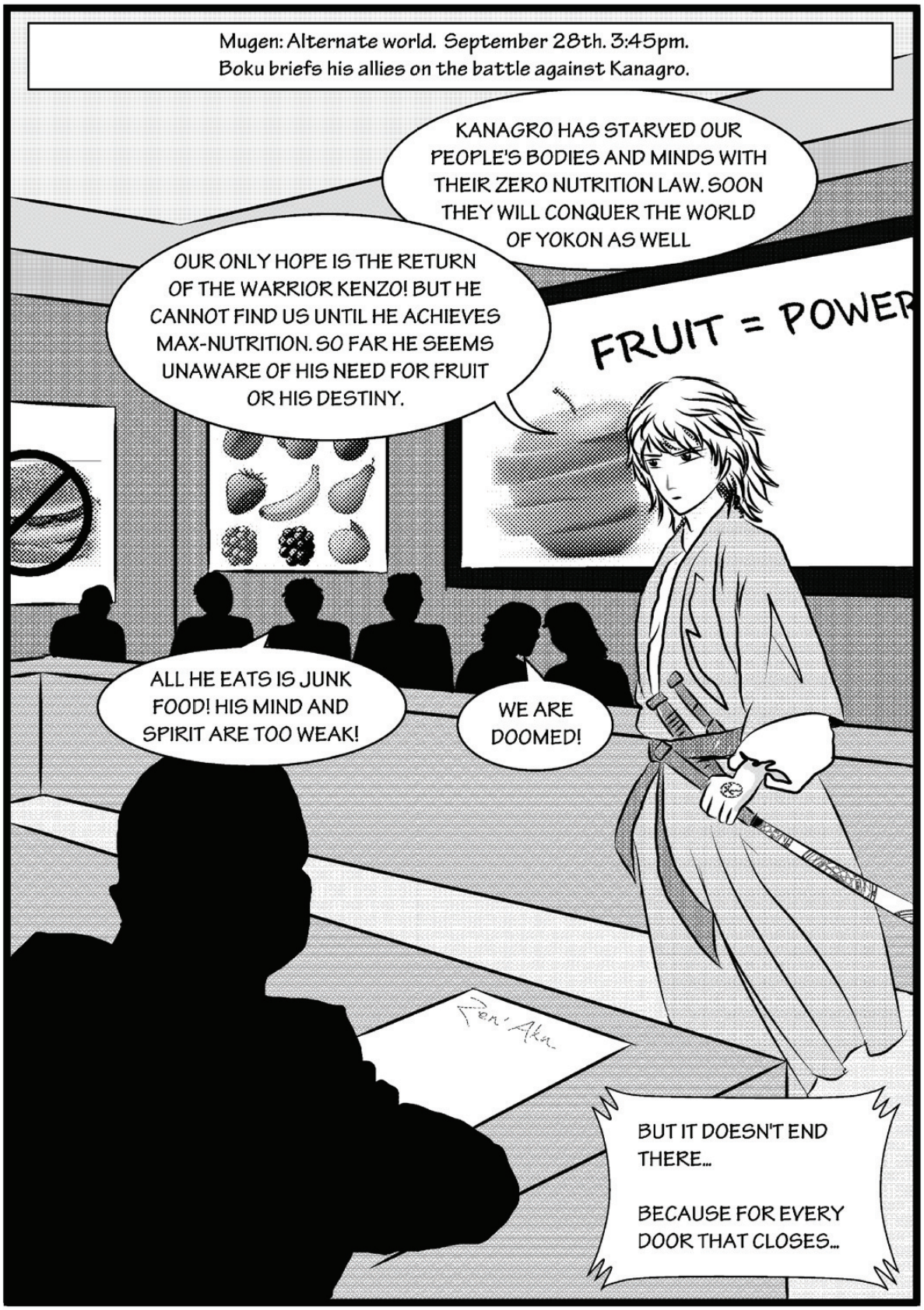
Jimo's time is spent thinking about how great he is and picking on anybody who might be smarter... which, it turns out, is most people!

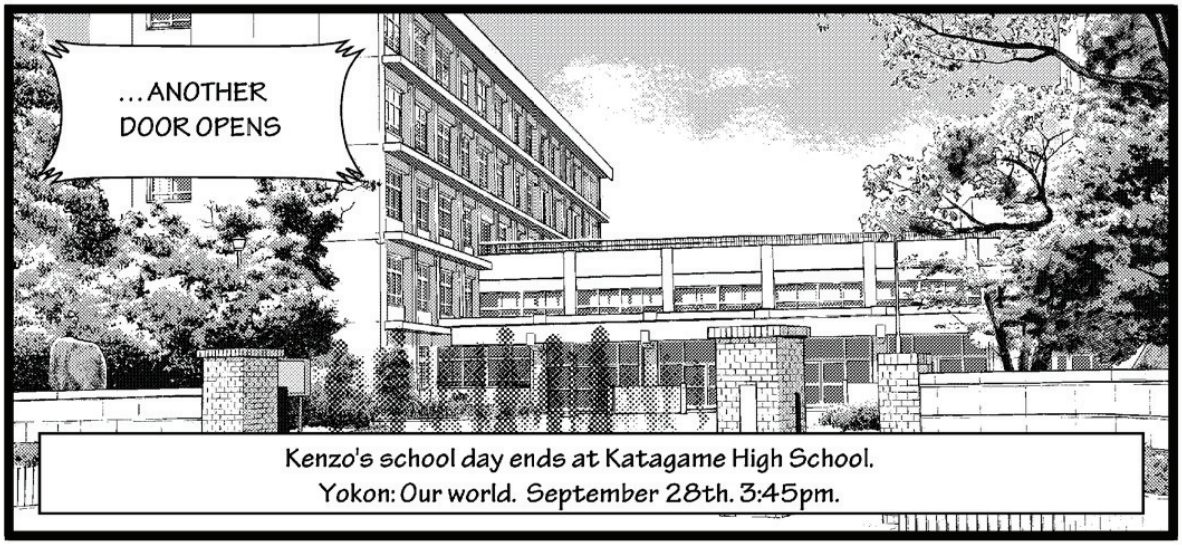
Somehow he has managed to date Hana, the cutest girl in school, much to Kenzo's disappointment and dismay!

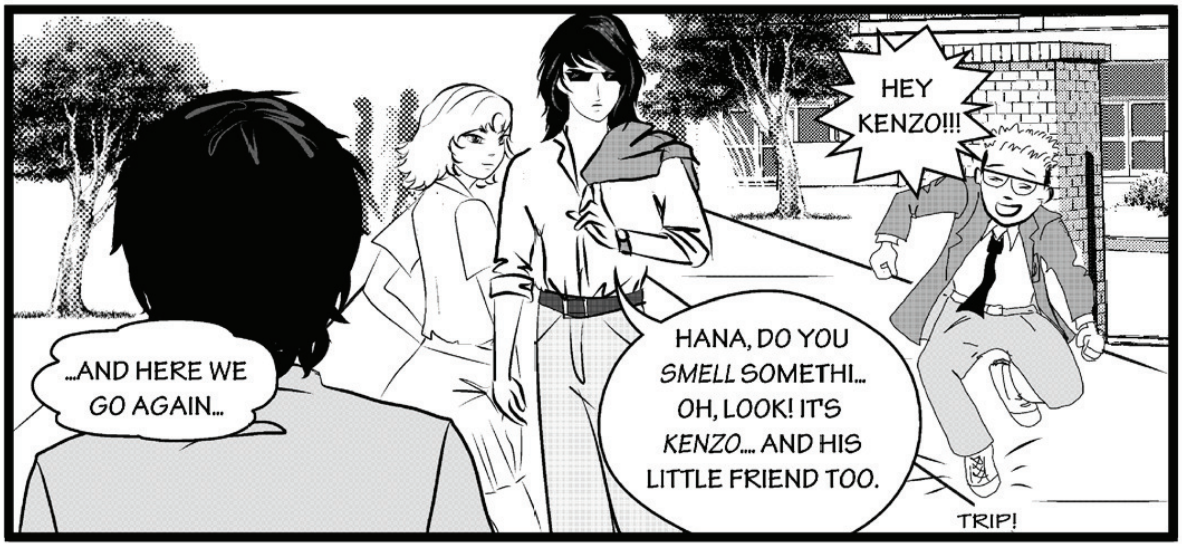
HANA

15 years old, female. The cool, pretty girl in school who would never look twice at Kenzo... or would she?


THERE ARE WORLDS FOR ALL POSSIBILITIES
WHERE THE BRAVE RISK EVERYTHING FOR WHAT IS RIGHT
AND FIGHT TO STOP THE WORLD FROM FALLING INTO RUIN
AND LOSE


Mugen: Alternate world. September 28th. 3:45pm.
Boku briefs his allies on the battle against Kanagro.
KANAGRO HAS STARVED OUR PEOPLE'S BODIES AND MINDS WITH THEIR ZERO NUTRITION LAW. SOON THEY WILL CONQUER THE WORLD OF YOKON AS WELL
OUR ONLY HOPE IS THE RETURN OF THE WARRIOR KENZO! BUT HE CANNOT FIND US UNTIL HE ACHIEVES MAX-NUTRITION. SO FAR HE SEEMS UNAWARE OF HIS NEED FOR FRUIT OR HIS DESTINY.
FRUIT = POWER
ALL HE EATS IS JUNK FOOD! HIS MIND AND SPIRIT ARE TOO WEAK!
WE ARE DOOMED!
BUT IT DOESN'T END THERE...
BECAUSE FOR EVERY DOOR THAT CLOSES...

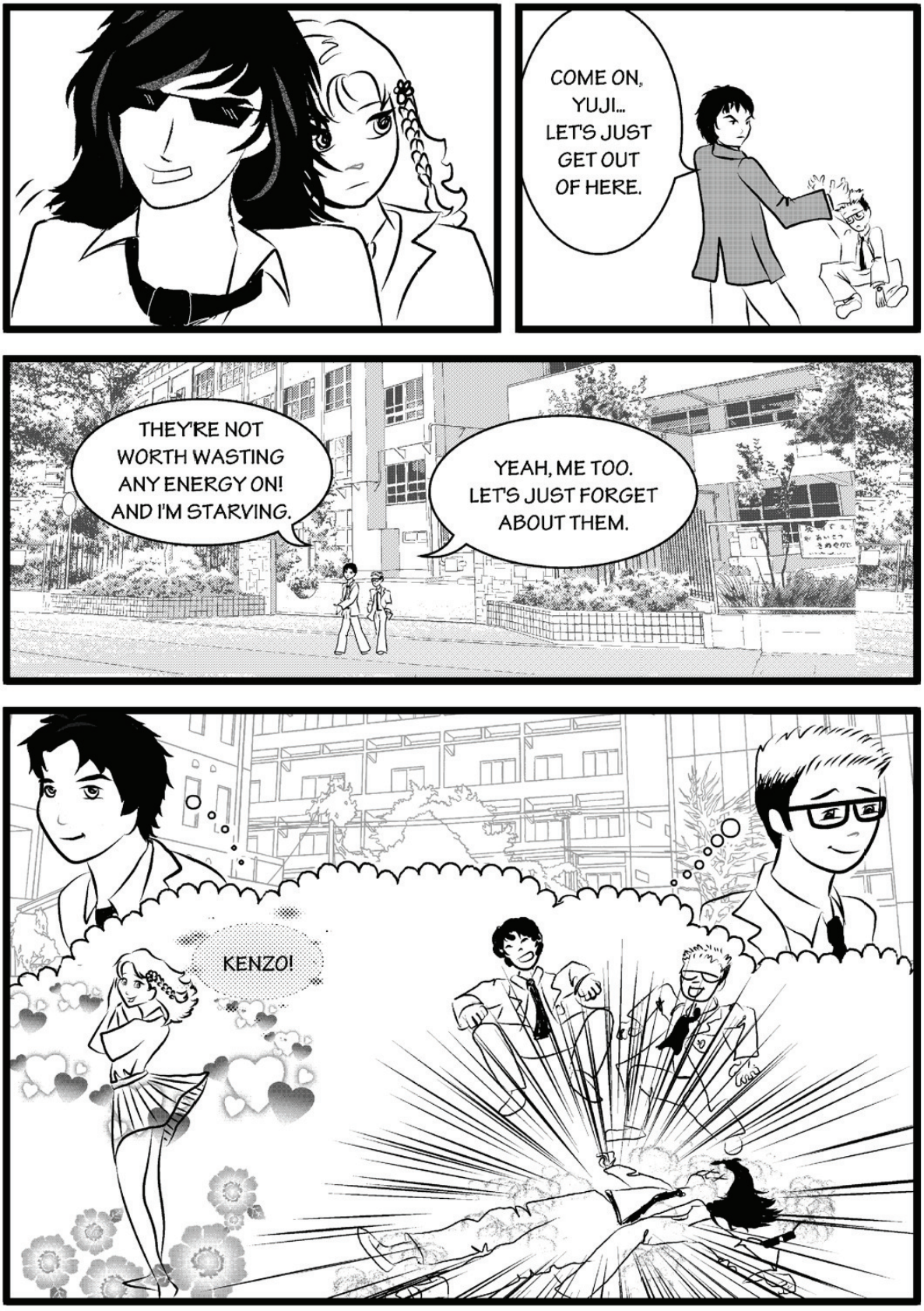

...ANOTHER DOOR OPENS
Kenzo's school day ends at Katagame High School.
Yokon: Our world. September 28th. 3:45pm.

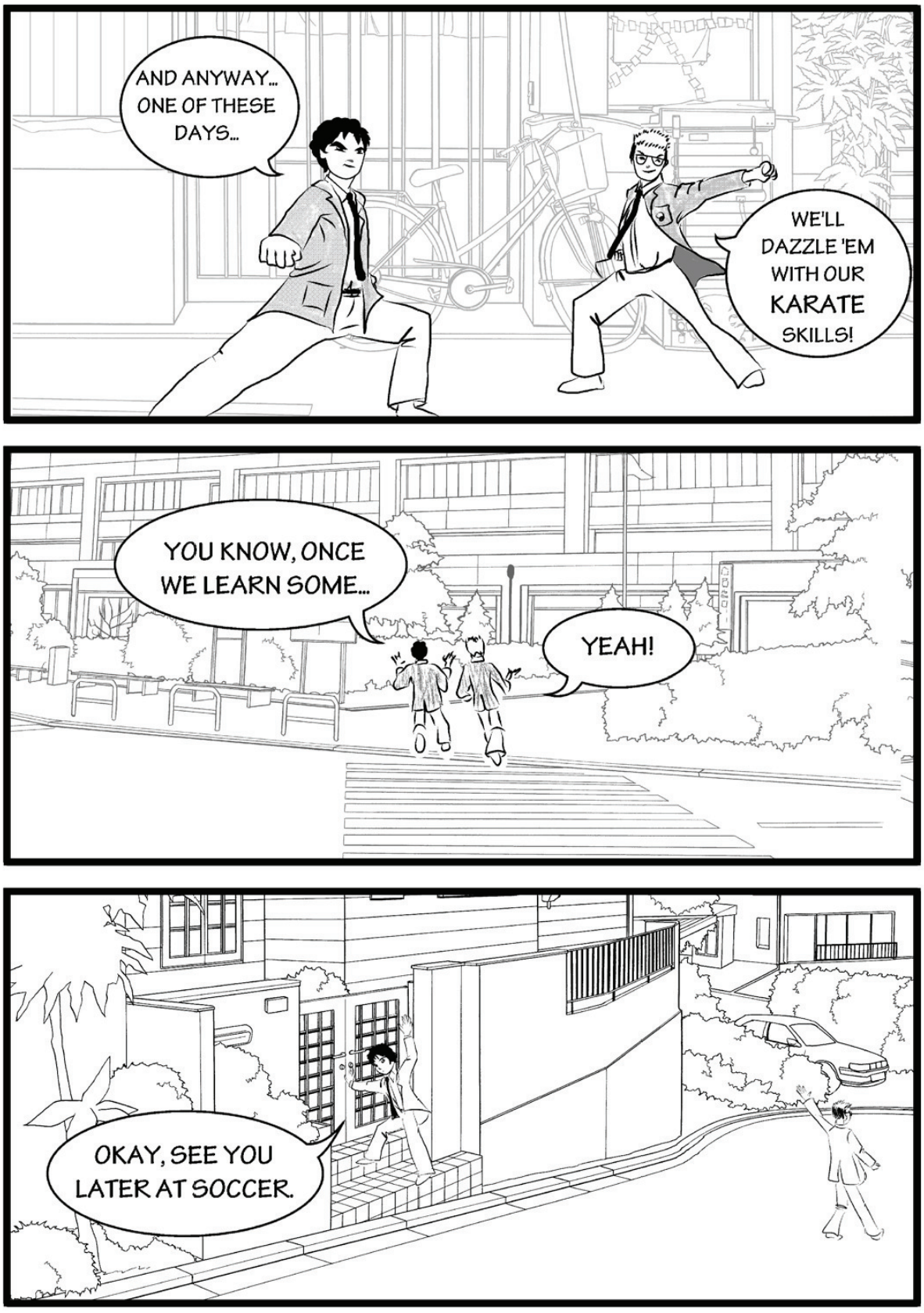

HEY KENZO!!!
...AND HERE WE GO AGAIN...
HANA, DO YOU SMELL SOMETHI... OH, LOOK! IT'S KENZO.... AND HIS LITTLE FRIEND TOO.
TRIP!


KRAAAAKKK

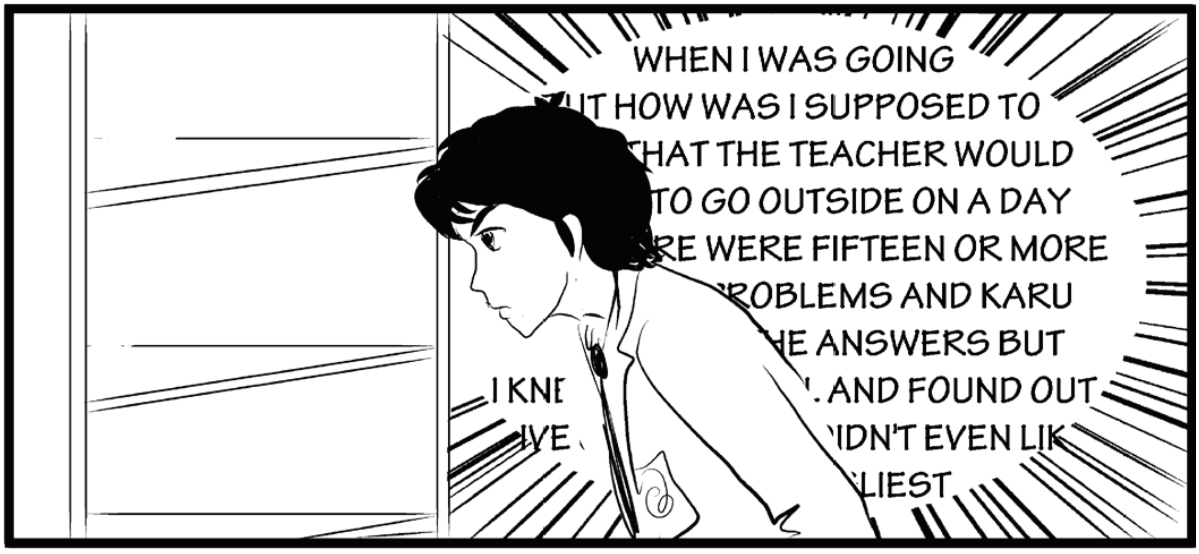

I'M SURE WE CAN LOOK FORWARD TO MUCH MORE OF THAT AT THE SOCCER GAME TONIGHT

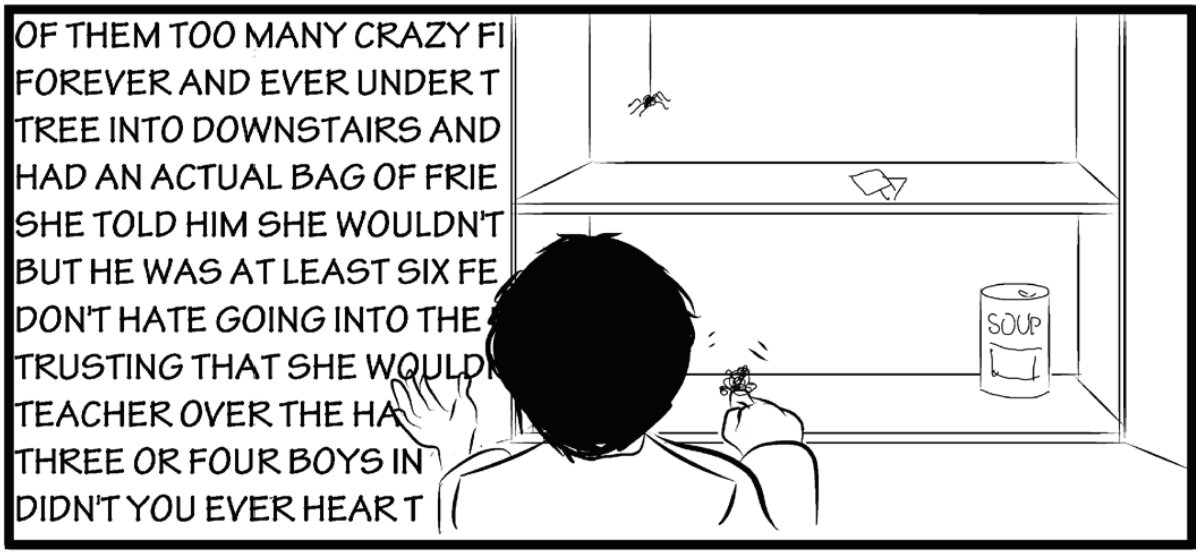

HA HAHA
HAHAHAHAAAA
NICE MOVES, YUJI!
HOHO HEE!

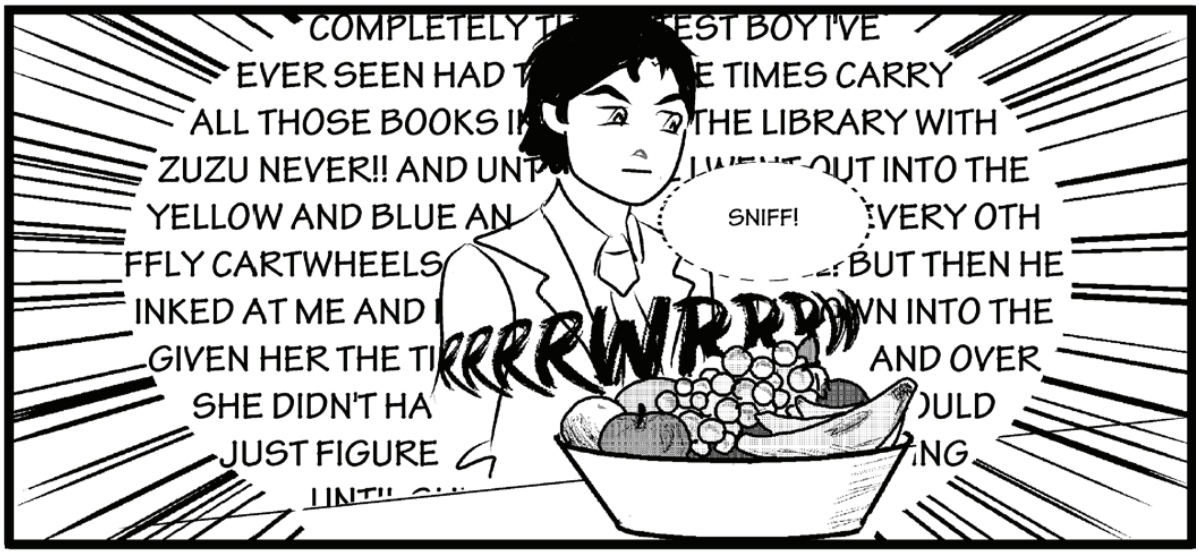

COME ON, YUJI... LET'S JUST GET OUT OF HERE.
THEY'RE NOT WORTH WASTING ANY ENERGY ON! AND I'M STARVING.
YEAH, ME TOO. LET'S JUST FORGET ABOUT THEM.
KENZO!


AND ANYWAY... ONE OF THESE DAYS...
WE'LL DAZZLE 'EM WITH OUR KARATE SKILLS!
YOU KNOW, ONCE WE LEARN SOME...
YEAH!
OKAY, SEE YOU LATER AT SOCCER.


HEY, NIKI, I'M HOME!
HI KENZO!! HOW WAS YOUR DAY?!
WELL....
SIGH
TOMO THAT I WOULD MOST DEFINITELY NOT PASS THAT NOTE TO KARU FOR HER BECAUSE IT REALLY WASN'T A VERY NICE
TO SOMEONE AND I THINK KARU HEARD ME SAY THAT BECAUSE
AND
RRRUMBLE
TIRED... AND HUNGRY


WHEN I WAS GOING
UT HOW WAS I SUPPOSED TO
HAT THE TEACHER WOULD
TO GO OUTSIDE ON A DAY
RE WERE FIFTEEN OR MORE
ROBLEMS AND KARU
HE ANSWERS BUT
I KNE
. AND FOUND OUT
IVE
IDN'T EVEN LIK
LIEST

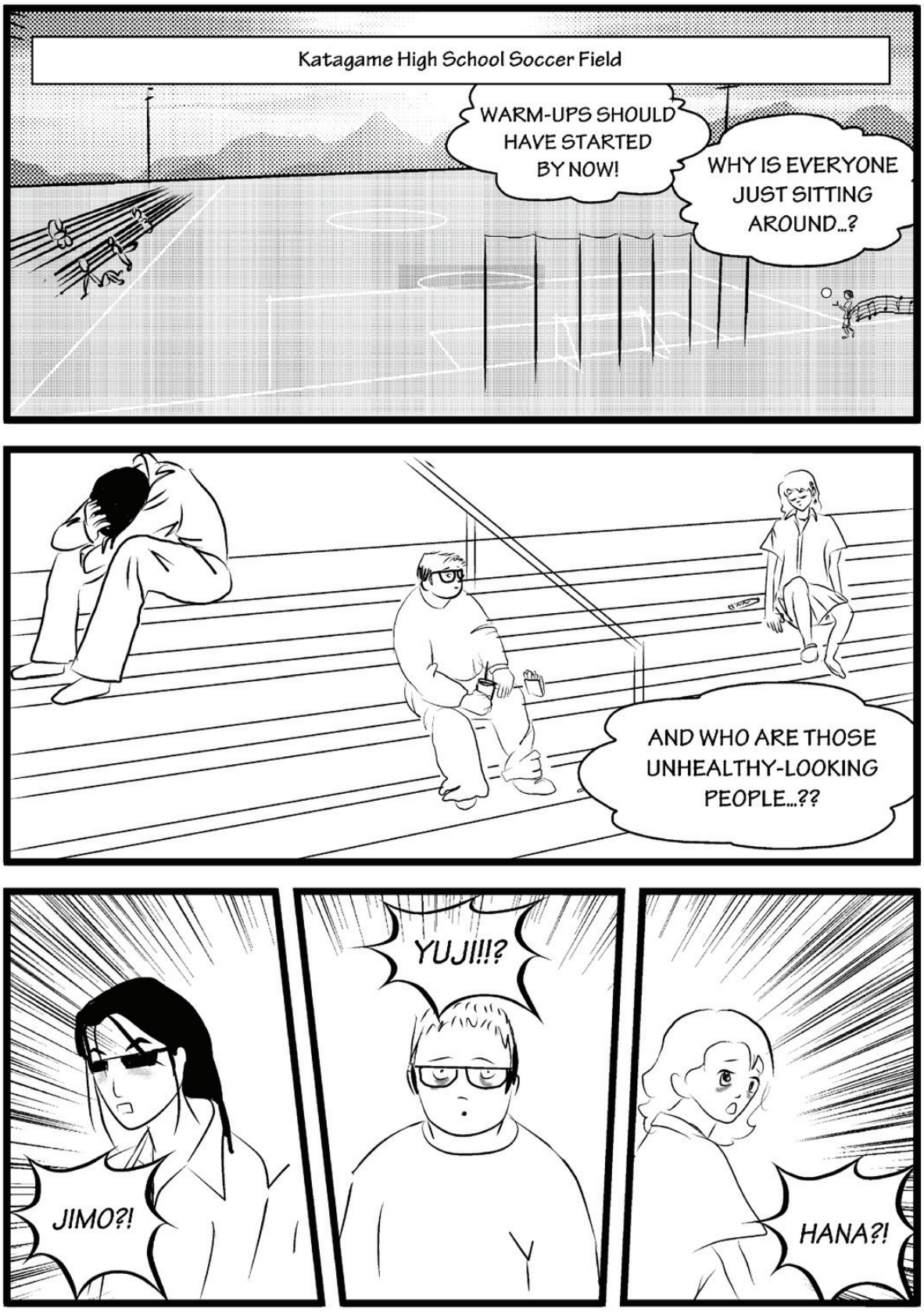

OF THEM TOO MANY CRAZY FI
FOREVER AND EVER UNDER T
TREE INTO DOWNSTAIRS AND
HAD AN ACTUAL BAG OF FRIE
SHE TOLD HIM SHE WOULDN'T
BUT HE WAS AT LEAST SIX FE
DON'T HATE GOING INTO THE
TRUSTING THAT SHE WOULD
TEACHER OVER THE HA
THREE OR FOUR BOYS IN
DIDN'T YOU EVER HEAR T
SOUP


COMPLETELY T
EST BOY I'VE
EVER SEEN HAD T
E TIMES CARRY
ALL THOSE BOOKS I
THE LIBRARY WITH
ZUZU NEVER!! AND UNT
UT INTO THE
YELLOW AND BLUE AN
VERY OTH
FFLY CARTWHEELS
BUT THEN HE
INKED AT ME AND
WN INTO THE
GIVEN HER THE TI
AND OVER
SHE DIDN'T HA
OULD
JUST FIGURE
NG
SNIFF!
RRRRWRRR

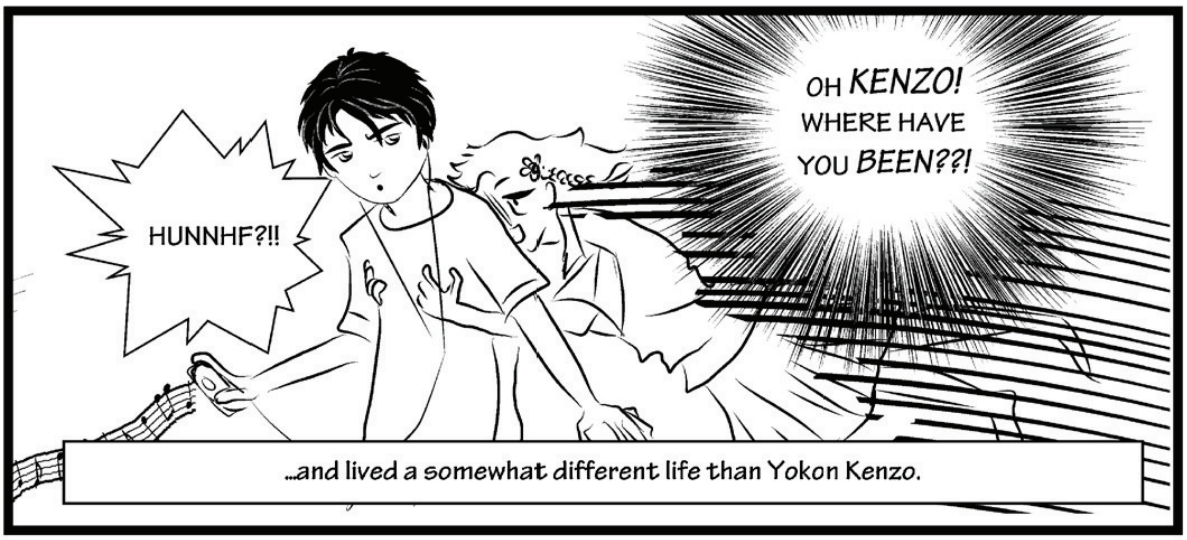

MUNCH
EVERY OTHER TIME THEY
MUNCH
MUNCH
CRRRUNCH
!!!
OKAY, SEE YOU THEN!
FINE.
KENZO'S ROOM
KEEP OUT!

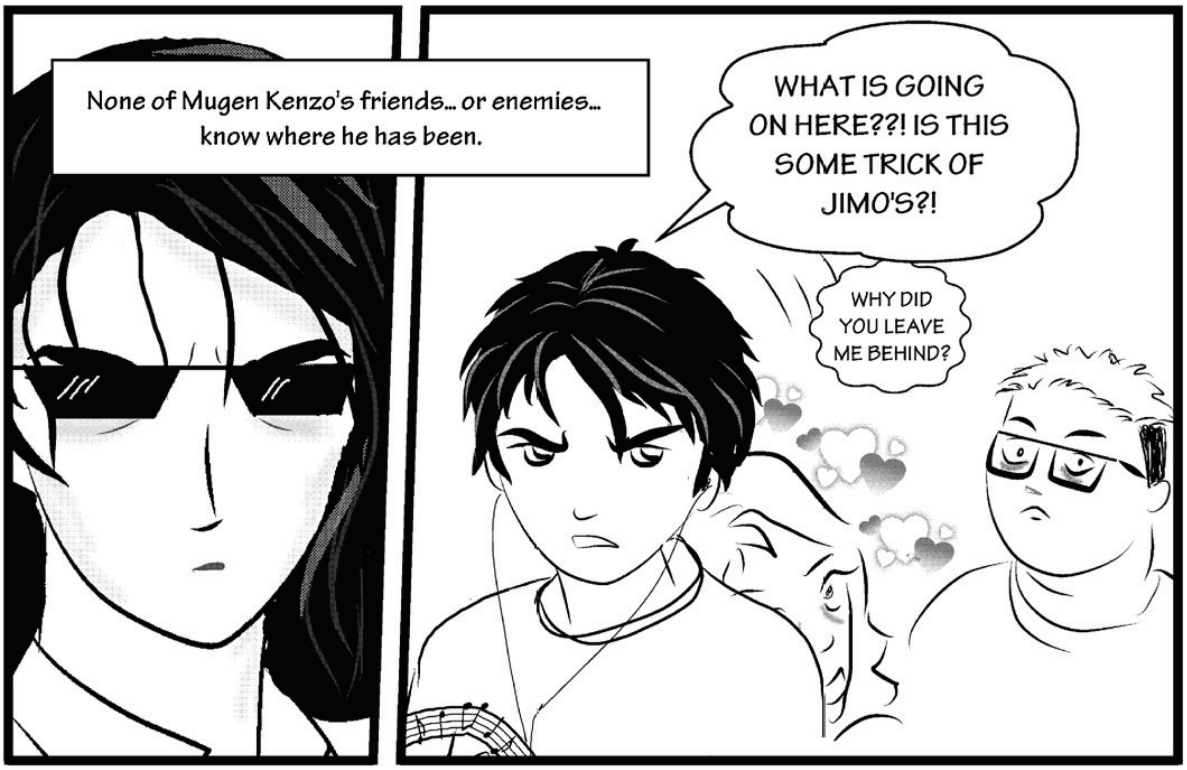

WOW, THIS FRUIT TASTES AWESOME!! NO WONDER DAVID BECKHAM LOVES FRUIT SO MUCH!
CRUNCH MUNCH
INCH MUNCH MUNCH
MUNCHA
CHECK ME OUT!


WOW!
THAT FRUIT WAS
GREAT!!
ENTERING
MUGEN
IT'S GONNA BE
MY NIGHT
AT SOCCER!
KENZO HAS NO IDEA
HE HAS JUST ENTERED
THE ALTERNATE WORLD
MUGEN!
TIME TO GO!
THAT WAS
WEIRD...
RAWWK!
KENZO? WANT
A BLUEBERRY?


Katagame High School Soccer Field
WARM-UPS SHOULD HAVE STARTED BY NOW!
WHY IS EVERYONE JUST SITTING AROUND...?
AND WHO ARE THOSE UNHEALTHY-LOOKING PEOPLE...??
JIMO?!
YUJI!!?
HANA?!


Mugen Kenzo has been missing for almost a year....

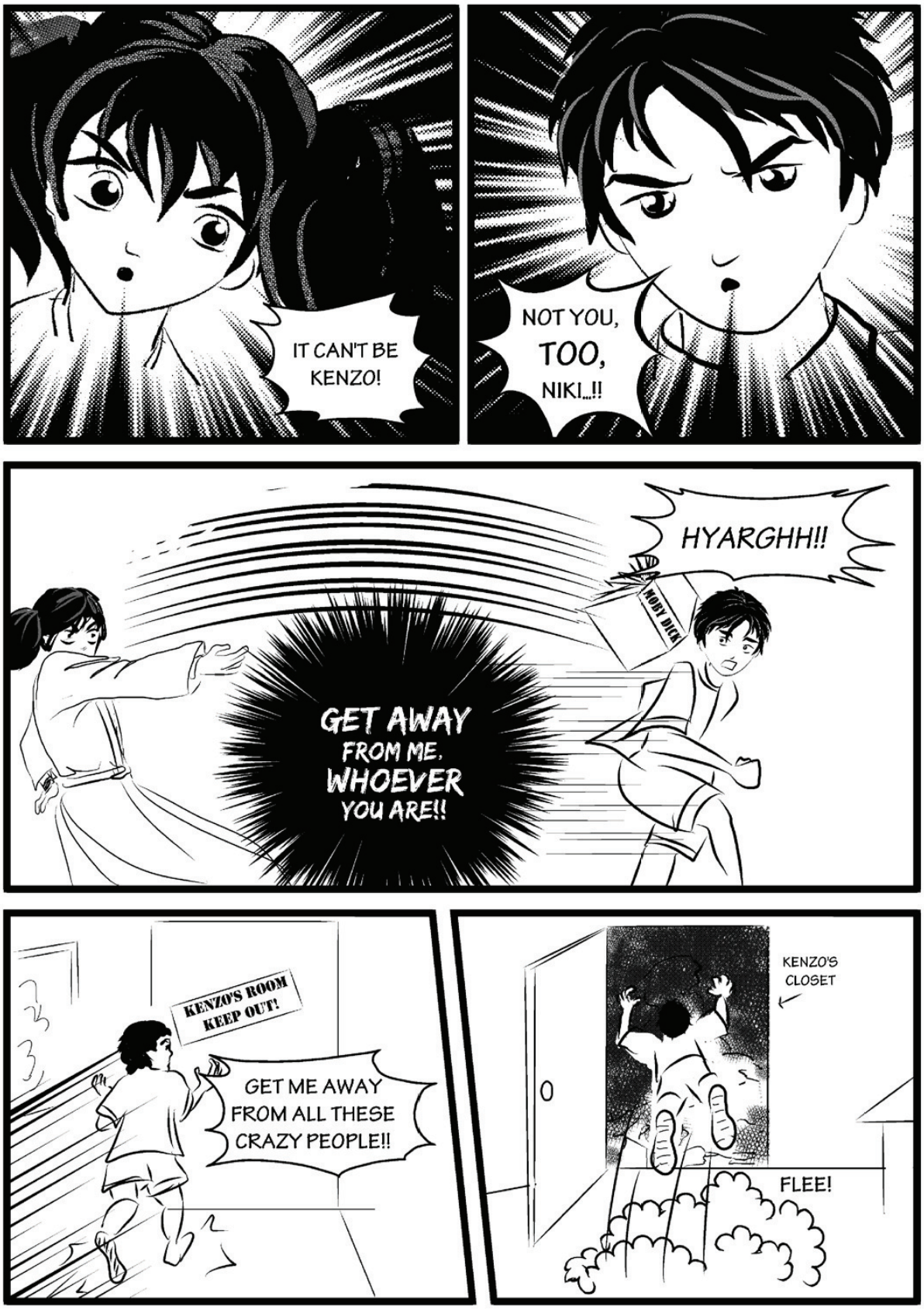

HUNNHF?!!
OH KENZO! WHERE HAVE YOU BEEN??!
...and lived a somewhat different life than Yokon Kenzo.


None of Mugen Kenzo's friends... or enemies... know where he has been.
WHAT IS GOING ON HERE??! IS THIS SOME TRICK OF JIMO'S?!
WHY DID YOU LEAVE ME BEHIND?


BUT HOW COULD JIMO MAKE HIMSELF LOOK SO SICK?
YOU'VE GOT A LOT OF NERVE SHOWING UP HERE AFTER THAT DISAPPEARING ACT YOU PULLED, KENZO!
...AND HOW COULD YUJI BE SO... AND WHY WOULD HE PLAY ALONG WITH JIMO:?!
THIS IS NOT FUNNY
IS THAT... KENZO...??
AND HANA'S EVEN ACTING LIKE... SHE *LIKES* ME! THEY HAVE TO BE PLAYING SOME KIND OF JOKE!
I MISSED YOU, KENZO!
SOME OF US ARE HERE FOR *SOCCER* AND NOT *SICK JOKES*! I'M OUTTA HERE!
WHERE DID HE GET THE ENERGY?
DID YOU SEE THAT?
WOW! ONLY A PRO COULD KICK A SHOT LIKE THAT... SINCE FRUIT WAS BANNED
SHHH... *THEY'LL* HEAR YOU

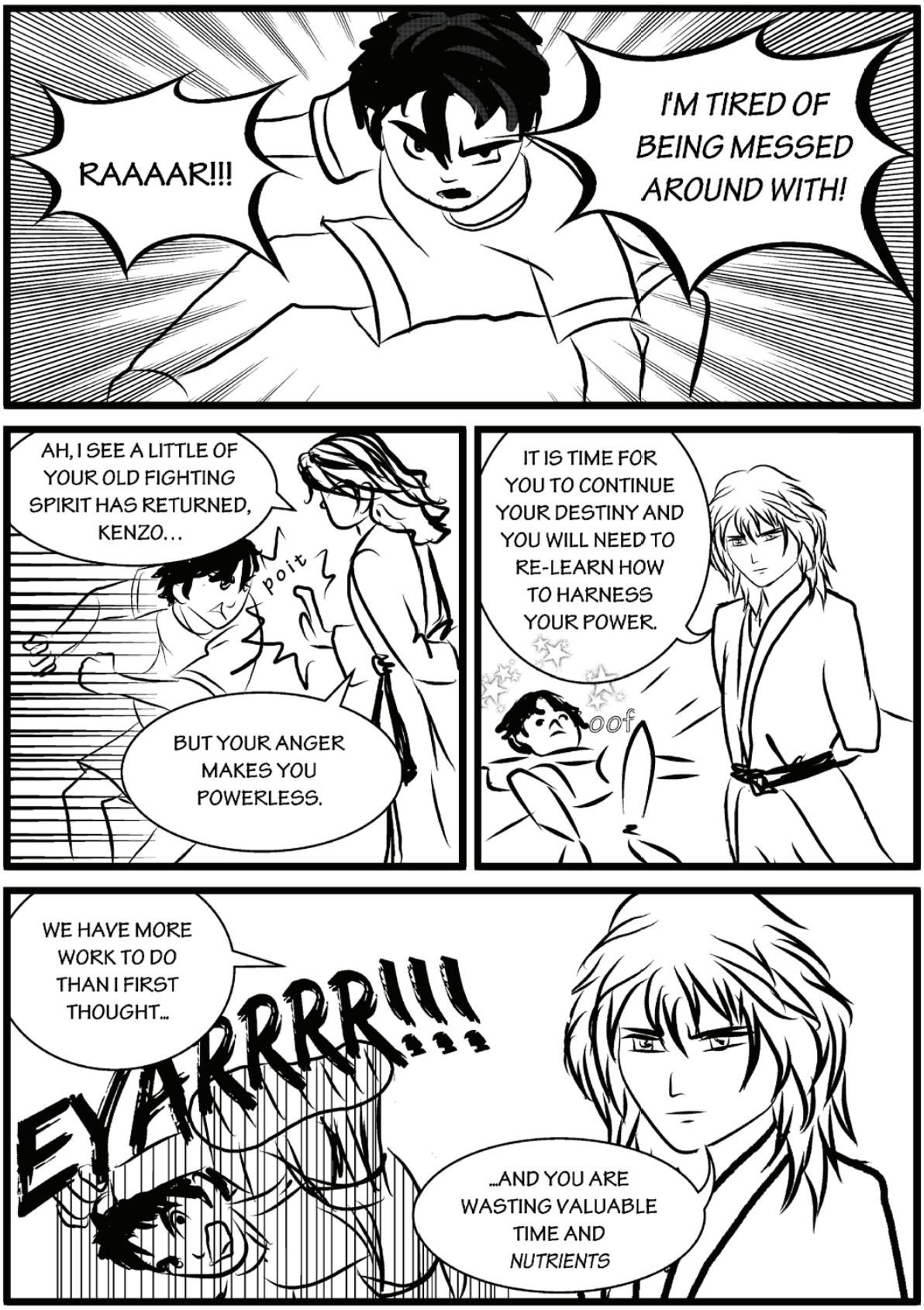

OKAY, CALM DOWN... IT'S JUST ANOTHER OF JIMO'S STUPID JOKES... RIGHT?
GRRRRR
ZZZT
MUMBLE
ZZT
KENZ
...
YES I'M TALKING TO YOU

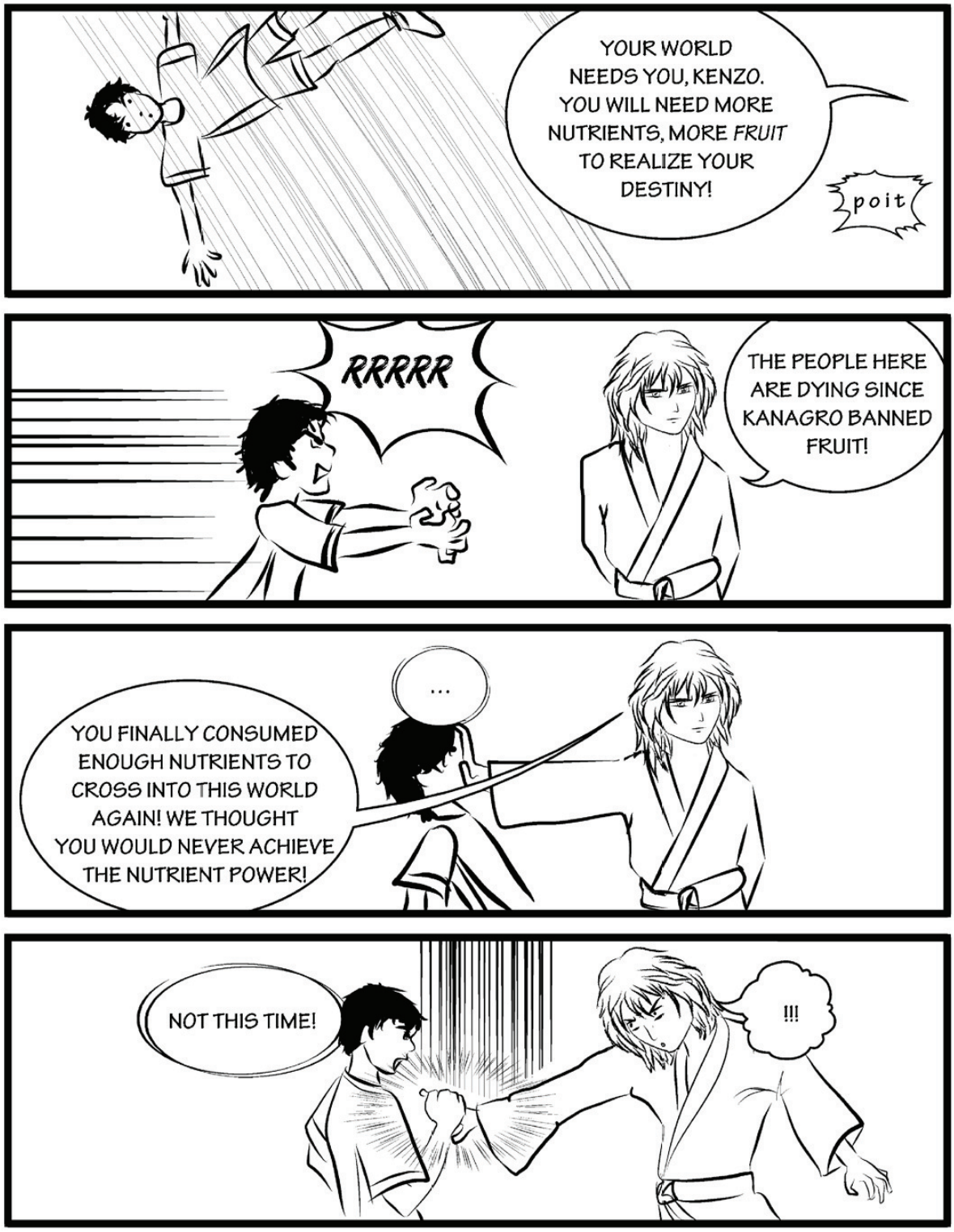

YYYYYARRRRRGHHH
HEY, COME BACK...
NIKI, ARE YOU HERE?! YOU WON'T BELIEVE WHAT'S BEEN HAPPENING!
!!!
KENZO??!
Of course, Niki hasn't seen Kenzo for almost a year, either...and never expected to see him again.

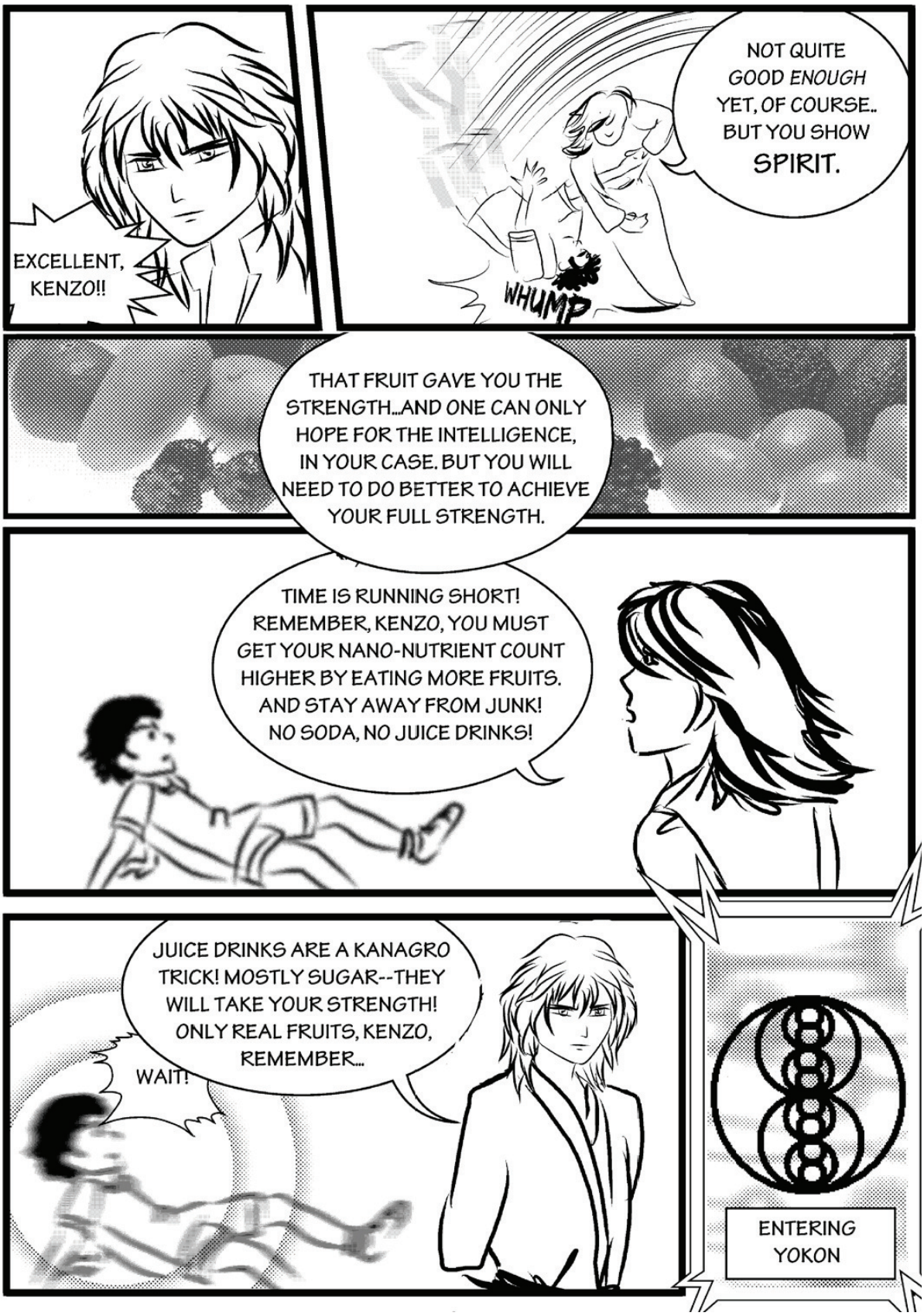

IT CAN'T BE KENZO!
NOT YOU, TOO, NIKI...!!
HYARGHH!!
MOBY DICK
GET AWAY FROM ME, WHOEVER YOU ARE!!
KENZO'S ROOM KEEP OUT!
GET ME AWAY FROM ALL THESE CRAZY PEOPLE!!
KENZO'S CLOSET
FLEE!


HOLD ON... WHAT AM I DOING HIDING FROM MY *LITTLE* SISTER IN A *CLOSET*?
GOOD QUESTION
ARGH!
HELLO AGAIN, KENZO

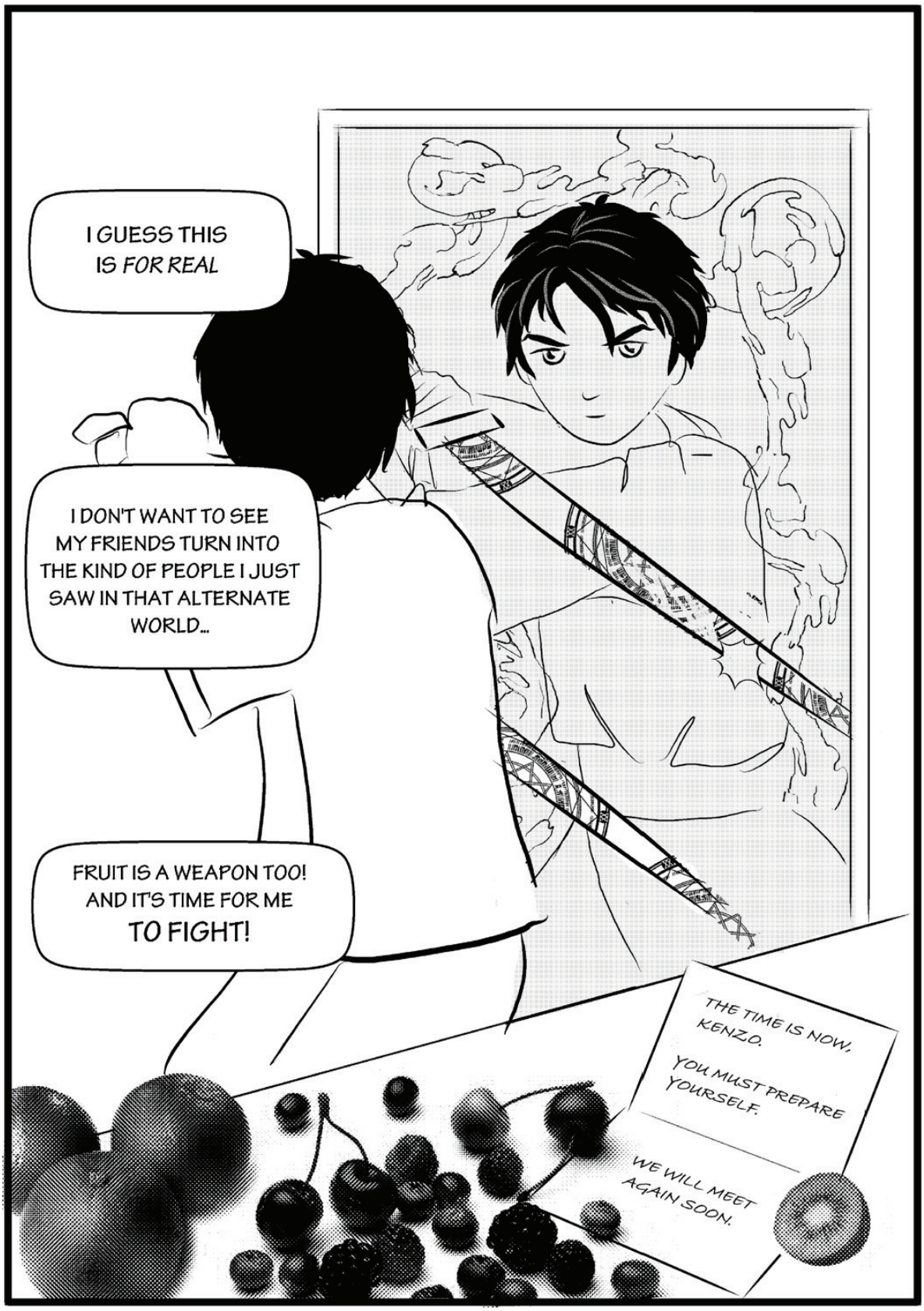

YOU SHOULD REALLY THINK ABOUT CLEANING YOUR ROOM ONCE IN A WHILE, KENZO.
THESE SOCKS ARE *TOXIC.*
YOU'RE WONDERING WHO I AM? WHY I'M IN YOUR ROOM?
C'MON, GENIUS, YOU MUST HAVE *SOME* MEMORIES IN THAT LITTLE BRAIN OF YOURS
WAKE UP, KENZO.
"LAST HOPE FOR HUMANITY..." HA! SITTING ON HIS BEHIND IN A PILE OF DIRTY LAUNDRY. DO YOU REMEMBER ANYTHING ABOUT BEING *STRONG*?
I'VE...
HAD...
ENOUGH.


RAAAAR!!!
I'M TIRED OF BEING MESSED AROUND WITH!
AH, I SEE A LITTLE OF YOUR OLD FIGHTING SPIRIT HAS RETURNED, KENZO…
poit
BUT YOUR ANGER MAKES YOU POWERLESS.
IT IS TIME FOR YOU TO CONTINUE YOUR DESTINY AND YOU WILL NEED TO RE-LEARN HOW TO HARNESS YOUR POWER.
oof
WE HAVE MORE WORK TO DO THAN I FIRST THOUGHT…
EYARRRR!!!
…AND YOU ARE WASTING VALUABLE TIME AND NUTRIENTS


YOUR WORLD NEEDS YOU, KENZO. YOU WILL NEED MORE NUTRIENTS, MORE *FRUIT* TO REALIZE YOUR DESTINY!
poit
RRRRR
THE PEOPLE HERE ARE DYING SINCE KANAGRO BANNED FRUIT!
...
YOU FINALLY CONSUMED ENOUGH NUTRIENTS TO CROSS INTO THIS WORLD AGAIN! WE THOUGHT YOU WOULD NEVER ACHIEVE THE NUTRIENT POWER!
NOT THIS TIME!
!!!


EXCELLENT, KENZO!!
NOT QUITE GOOD ENOUGH YET, OF COURSE.. BUT YOU SHOW SPIRIT.
WHUMP
THAT FRUIT GAVE YOU THE STRENGTH...AND ONE CAN ONLY HOPE FOR THE INTELLIGENCE, IN YOUR CASE. BUT YOU WILL NEED TO DO BETTER TO ACHIEVE YOUR FULL STRENGTH.
TIME IS RUNNING SHORT! REMEMBER, KENZO, YOU MUST GET YOUR NANO-NUTRIENT COUNT HIGHER BY EATING MORE FRUITS. AND STAY AWAY FROM JUNK! NO SODA, NO JUICE DRINKS!
JUICE DRINKS ARE A KANAGRO TRICK! MOSTLY SUGAR--THEY WILL TAKE YOUR STRENGTH! ONLY REAL FRUITS, KENZO, REMEMBER...
WAIT!
ENTERING YOKON


DID THAT REALLY HAPPEN??!
KENZO, WHAT IN THE WORLD ARE YOU DOING?
I THOUGHT YOU WERE GOING TO SOCCER!
SOME GUY LEFT YOU THIS PACKAGE
NIKI'S BACK TO NORMAL...
PROPERTY OF KENZO
WOAH...
WEAPONS...
AND FRUIT...
AND THIS

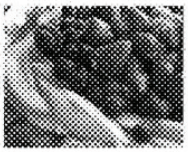

I GUESS THIS IS FOR REAL
I DON'T WANT TO SEE MY FRIENDS TURN INTO THE KIND OF PEOPLE I JUST SAW IN THAT ALTERNATE WORLD...
FRUIT IS A WEAPON TOO! AND IT'S TIME FOR ME TO FIGHT!
THE TIME IS NOW, KENZO.
YOU MUST PREPARE YOURSELF.
WE WILL MEET AGAIN SOON.

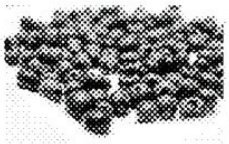
A NOTE FROM KENZO...

HI! I have much more learning and training to do before my ultimate battle. But, I've learned that I need to eat enough fruit to maintain the right level of nano-nutrients. This keeps me strong and gives me the necessary energy. There are tons of benefits of fruit and I wanted to share some info. Find out for yourself how good fruit could make you feel!

-Kenzo

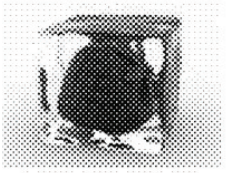
- **Phytochemicals:** It's pronounced *"FIGHT-O-CHEMICALS."* Phytochemicals give fruits their bright colors. They work with vitamins and minerals to keep our bodies healthy and give me my nano-nutrient power!

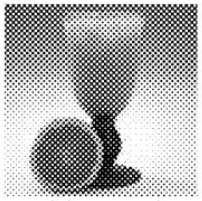




- Most kids don't eat enough fruit. Eat <u>at least</u> **3** to **4** servings of fruits every day for good health. I eat more to keep my energy levels high!

- *Fresh, frozen, canned* and *dried* fruits all count toward our daily recommended intake.





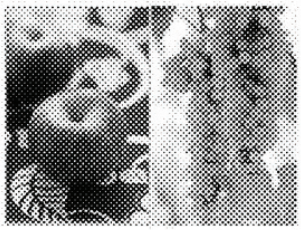
- Watch the juice intake. Juice can be high in sugar.

SUPERFOODS!

There are some fruits that are really packed with nutrients!

These fruits are really high in <u>water</u>, <u>vitamin C</u> and <u>fiber</u>. They help with energy levels and blueberries can even improve memory!!

- ***Blueberries***
- ***Bananas***
- ***Grapes***
- ***Oranges***
- ***Apples***



APPENDIX H

FRUIT NEWSLETTER

Meet Kenzo:

Hi! My name is Kenzo. I'm a sophmore in high school and a member of the school's soccer team. 90 minutes of running and making quick decisions is nothing to laugh at. Every little bit of energy is a plus and eating the right types of foods, such as fruits, makes things a lot easier. I've learned some interesting information about fruit and wanted to share some of it with you. Enjoy!

-Kenzo

Benefits of Eating Fruits:

- Fruits have different vitamins, like A & C, and minerals, like calcium and potassium. This all provides energy and promotes strong bones and a healthy body.
- Fruits have fiber, which keeps the body in balance and healthy.
- Fruits contain "phytochemicals". It's pronounced "FIGHT-O-CHEMICALS". Phytochemicals give fruits and vegetables their bright colors. They work with vitamins and minerals to keep bodies healthy.
- Eating colorful fruits every day will increase phytochemical levels. The stronger the color, the better the benefit. Deep colored fruits have some of the best benefits.

Superfoods: All fruits are great, but there are some fruits that are really packed with nutrients!

Blueberries:

- A superfood for the brain
- Known as "brain berries"
- Regular blueberry consumption improves memory and brain function
- 85% water - great source for hydration
- Rich source of vitamin C

Bananas:

- Provides lots of energy
- 75% water - helps the body to hydrate
- Good source of fiber
- Easy to carry

Grapes:

- Rich in vitamin C
- 81% water - aid body and brain through hydration, nutrition and energy
- Make great snacks - Kds put grapes in their lunch bags or munch on grapes right after school while walking home

Apples:

- Lots of fiber to help keep one healthy
- Good source of energy
- 84% water - aid in hydration
- Crunchy and juicy
- Some varieties are so small they can fit in a pocket

Oranges:

- Rich in vitamin C - 1 medium orange provides almost 100% of the daily recommended amount
- Great source of fiber
- Awesome source of energy
- 87% water - great source for hydration
- One of the juiciest fruits

:**High in Fiber** :**Great source of Energy**

:**Great for the Brain** :**High in water**

Choosing the best fruits:

- Apples should have smooth, firm surfaces that are free of bruises. Some apples may have a brownish freckled surface on skin. This is usually caused by weather, but they'll taste just as good.

- Bananas should be completely yellow when ripe. A banana with a lot of brown spots actually tastes better than a yellow banana with a green top. Put bananas in a fruit bowl in the sun to ripen quickly.
- Blueberries should be completely dark blue. If they have a slight redness to them, they will taste tart.

Fun Fact:

Strawberries are the only fruit in the world with its seeds on the outside.

Funky Fruit:

Sapodilla:

- Sweet, creamy fruit with brown skin about the size of a small tomato
- Has a unique fruity and spicy flavor like cinnamon, pear, banana, melon and apple when ripe
- Chinese call it "the fruit of life" and its flavor lives up to the name
- Its sap is used to make chewing gum

Fun Fact:

Citrus grew in Asia 20 million years ago.

What's a Serving?

Here are some examples of a serving of fruit:

1 small banana or apple

16 grapes

One handful of raisins or a mini box

One glass of 100% fruit juice

Tips to Eat More Fruits:

Most kids don't eat enough fruit. Kids should be eating at least 3 to 4 servings every day (except fruit juice because it can be high in sugar). There are tons of ways to eat more fruit.

- Keep a bowl of fruit on the kitchen counter-Just grab a piece when passing through.
- Cut-up fruit and store it in a ziplock bag in the fridge for later.
- Dried fruits make a great snack. They're really easy to carry. They can be tossed into a backpack or sports bag and be eaten anytime.
- Dried, frozen, canned or fresh fruits all count as part of daily fruit intake. Try to keep 100% fruit juice to 1 cup a day.
- Try some berries with yogurt as a tasty dessert.

WORD SEARCH

S J I T L V I U Z M S P
E S E I R R E H C B E I
P K V U S A P I M G Q N
A E I R W A W L N A O E
R F S F M I N A U L E A
G B Y E K B R A E M C P
Q D Y P F O J M N C S P
S I W A F U R P E A R L
S E I R R E B E U L B E
U P B G T H C A E P N M
S T R A W B E R R Y C O
F R W L A P P L E I X N

Grapes	Kiwi	Bananas	Grapefruit
Blueberries	Orange	Pear	Pineapple
Strawberry	Apple	Cherries	Watermelon

APPENDIX I

ANCIENT GREECE NEWSLETTER

THE WONDERS OF ANCIENT GREECE

Meet Kenzo

Hi! My name is Kenzo. I'm a sophmore in high school and President of the History club. We're studying Ancient Greece & Greek mythology right now and I've been learning lots of interesting things so I wanted to share some of them with you. Hopefully, I'll be able to visit Greece one day to see it all for myself! Enjoy!

-Kenzo

Greece

- The country is in southeastern Europe. The Aegean Sea lies to the east, while the Ionian Sea is to the west.
- Mainland Greece juts out into the sea so it has a large coastline. It's the tenth longest coastline in the world.
- Most of Greece consists of mountains or hills, which makes the country one of the most mountainous in Europe.
- Mount Olympus, a famous site of Greek culture, peaks at 9,570 ft, the highest point in the country. It was once considered the throne of the Greek mythological Gods and is now extremely popular among hikers and climbers.

History of Ancient Greece

The history of Greece can be traced back to the Stone Age, which is a prehistoric time period when humans mainly used stone for toolmaking. Later came early farmers. This was followed by a period of wars and invasions, known as the Dark Ages. In about 1100 BC, a group of people called the Dorians invaded. In the period from 500-336 BC, Greece was divided into small city states, each of which consisted of a city and its surrounding countryside. Since there were only a few historians in the time of Ancient Greece, most forms of Ancient Greek knowledge we know is because of temples, sculpture, pot-

Art in Ancient Greece

Greek art has had a profound effect throughout the ages. Many of the styles have been reproduced and influenced some of the finest Western and Eastern artists.

The Greeks used many different types of materials in their sculptures including stone, marble and limestone as these were abundant in Greece. Other materials, such as clay, were also used but due to their brittle nature very few have survived.

Greek art is very important as the vast majority of them tell us a story about Gods, Heroes, Events, and Mythical Creatures.

The temples of ancient Greece were also some of the biggest and most beautiful. They also had political purpose as they were often built to celebrate power and pride or offer thanks

Greek Gods and Goddesses

Zeus

The most powerful Greek God was Zeus. He was the king of the gods, fierce, feared, all powerful and very strong. His weapon was a thunderbolt. According to ancient myths, Zeus and his brothers, Poseidon and Hades, split the kingdom. Zeus took the land, Poseidon the sea and Hades the underworld. Zeus lived on Mount Olympus, his wife was Hera, and he was father to Apollo and Athena.

Poseidon

Zeus' brother Poseidon was the god of the sea. He was second only to Zeus in power among the gods. His weapon was a trident, which could shake the earth, and shatter any object. Under the ocean, he had a marvelous golden palace. Poseidon was a dreadful enemy, to upset him was to guarantee disaster to any sea journey one might make.

Prometheus

Prometheus was responsible for creating man. His name means "forethought" and he was able to tell the future. Prometheus gave mankind a number of gifts, including fire.

Aphrodite

Aphrodite was the goddess of love and beauty. Because of her beauty, other gods feared that jealousy would interrupt the peace between them and could lead to war.

Hades

Zeus' other brother, Hades, was the god of the underground. He ruled the unseen realm, where the dead go after leaving the world.

Hera

Hera was Zeus famous wife. She was the protector of women and marriage.

Athena

Athena was Zeus' daughter, who was the goddess of wisdom, warfare and art. She was fierce and brave in battle, but only fought to protect the state and home from outside enemies.

Apollo

One of Zeus' sons, Apollo, was the god of sun, light, music and truth. He was a gifted musician, who delighted the gods with his performance and also controlled science, healing and poetry.

Hercules

Half god, half man, Hercules was the greatest hero of Greek mythology.

Cyclops

The Cyclops were giants with a single, round eye in the middle of their foreheads. They helped Zeus defeat their brother, Cronus, by forging lightning bolts. They also made Poseidon's trident and Hades invisibility cap.

Everyday Life in Ancient Greece

- If the men were not training in military or discussing politics, they went to the theater for entertainment. They would watch dramas that they could relate to, which included comedies and often involved current politics and gods in some form.

- The lives of women were closely tied to house work, spinning, weaving and other domestic duties. They were usually not involved in public life or in politics, although one public duty was working in a temple.

- Children usually occupied their time playing with toys and games, and of course, school.

WORD SEARCH

F P Z O A G S E A C y y J D Z
Z J E R L U F E N y A Z P P H
J E E R P L O K E C T E V L O
Q S U M S R O S H L H J J A E
B X y S R E U P T O U A B K T
J L A R E H U A A P G J R A I
O R E G A U U S T S L X Q P X
E T I D O R H P A N L X y S y
D A D U S A C O T R I D E N T
G C I C G R F U G M L C D F U

Aphrodite
Zeus
Athena
cyclops

Olympus
trident
Hera
Apollo

APPENDIX J

AIM 3 PARENTAL CONSENT FORM (ENGLISH)

University of North Carolina-Chapel Hill
Parental Permission for a Minor Child to Participate in a Research Study

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IRB Study # 08-1627
Consent Form Version Date: April 23, 2009

Title of Study: Impact of a Manga comic with health messages on nutrition and physical activity beliefs

Principal Investigator: May May Leung, MS, RD
UNC-Chapel Hill Department: Nutrition, School of Public Health
UNC-Chapel Hill Phone number: 919.843.9466
Email Address: mmleung@unc.edu
Faculty Advisor: Alice Ammerman, DrPH, RD

Study Contact telephone number: 919.843.9466
Study Contact email: mmleung@unc.edu

What are some general things you should know about research studies?

You are being asked to allow your child to take part in a research study. To join the study is voluntary. You may refuse to give permission, or you may withdraw your permission for your child to be in the study, for any reason. Even if you give your permission, your child can decide not to be in the study or to leave the study early.

Research studies are designed to obtain new knowledge. This new information may help people in the future. Your child may not receive any direct benefit from being in the research study. There also may be risks to being in research studies.

Details about this study are discussed below. It is important that you understand this information so that you and your child can make an informed choice about being in this research study. You will be given a copy of this permission form. You and your child should ask the researcher named above, any questions you have about this study at any time.

What is the purpose of this study?

The purpose of this research study is to understand how different health communication material can influence how youth think about nutrition and physical activity. We will use this information to help develop effective health communication materials to improve youths' thoughts about nutrition.

Are there any reasons your child should not be in this study?
Your child should not be in this study if he/she is not able to participate in two to three 45-minute sessions over a one-week period.

How many people will take part in this study?
If your child is in this study, your child will be one of about 300 other students to participate in this research project.

How long will your child's part in this study last?
If your child is in this study, we will ask him/her to attend two to three sessions over a one week period. Each session will last about 45 minutes. The overall participation time is no more than 3 hours. Once the two or three sessions are over, your child's participation in the study is complete. There is no follow up.

What will happen if your child takes part in the study?

- In **Session 1**-Questionnaires related to nutrition/physical activity thoughts, knowledge and behaviors will be completed.
- In **Session 2**-Your child will be randomly assigned to one of three groups. Random assignment means that the participants will be assigned to the different groups by chance, like flipping a coin.
    - *Group 1* will receive a Greek mythology newsletter.
    - *Group 2* will receive a nutrition and physical activity newsletter.
    - *Group 3* will receive a comic about nutrition and physical activity.
    - After reading the materials, your child will be asked to complete a questionnaire about nutrition and physical activity and what s/he thought about the material that was read.
- In **Session 3**-We may ask your child to be a part of a group discussion. The discussion will be about health communication materials. The researcher is interested in whether or not your child enjoyed reading the material and what ideas s/he may have to make health materials better for youth.

The group discussion will be audiotaped with permission from your child. Your child has the right to ask for the recording to be stopped or to say something without it being recorded. Your child may also choose not to answer any question on the questionnaires for any reason and/or stop participation whenever s/he wants.

What are the possible benefits from being in this study?
Research is designed to benefit society by gaining new knowledge. You may also expect your child to benefit by being in this study by having the opportunity to think and talk about personal nutrition and physical activity behaviors. By participating in the study, your child may increase his/her motivation to eat more healthily and/or be more physically active. S/he may also enjoy reading and talking about health communication materials.

What are the possible risks or discomforts involved from being in this study?
Researchers are required to explain any possible problems that their study might cause. It is very unlikely that this study will cause any problems for your child as there are no known risks

for being in this study. A possible problem may be embarrassment during the group discussion. Participants are not required to discuss any topics that they are not comfortable with and can leave the group at any time. There may be uncommon or previously unknown risks. You should report any problems to the researcher.

How will your child's privacy be protected?

We will also do everything possible to protect your child's privacy. During the group discussion, confidentiality within the group will be emphasized and each individual must agree not to share specific discussion details with those outside the group discussion sessions. Your child's name will not appear on any study documents, instead a code number will be given to your child, which will be used in study documents to protect the confidentiality of participants and prevent linking of data to participants. The list which matches names and code numbers will be kept in a locked cabinet. Your child does not need to reveal his/her true name, if they do not want to. S/he may use a fictitious name.

All hard-copy data and records will be kept in a secure, locked location in the Principal Investigator's office and following the transcription of audio-taped recordings, all tapes will be erased. Any electronic files will be uploaded onto a password-protected computer only accessible to the UNC researcher.

Participants will not be identified in any report or publication about this study. Although every effort will be made to keep research records private, there may be times when federal or state law requires the disclosure of such records, including personal information. This is very unlikely, but if disclosure is ever required, UNC-Chapel Hill will take steps allowable by law to protect the privacy of personal information. In some cases, your child's information in this research study could be reviewed by representatives of the University, research sponsors, or government agencies for purposes such as quality control or safety.

Will your child receive anything for being in this study?

At the end of the study, your child will receive school supplies or Manga-related souvenirs (estimated $5 value) for taking part in this study.

Will it cost you anything for your child to be in this study?

There will be no costs for being in the study other than your child's time and any travel costs involved in attending the sessions at school.

What if you or your child has questions about this study?

You and your child have the right to ask, and have answered, any questions you may have about this research. If you have questions or concerns, you should contact the researchers listed on the first page of this form.

What if you or your child has questions about your child's rights as a research participant?

All research on human volunteers is reviewed by a committee that works to protect your child's rights and welfare. If you or your child has questions or concerns about your child's rights as a research subject you may contact, anonymously if you wish, the Institutional Review Board at 919-966-3113 or by email to IRB_subjects@unc.edu.

- -

Title of Study: Impact of a Manga comic with health messages on nutrition and physical activity beliefs
Principal Investigator: May May Leung, MS, RD

Parent's Agreement:

I have read the information provided above. I have asked all the questions I have at this time. I voluntarily give permission to allow my child to participate in this research study.

____
Printed Name of Research Participant (Child)

____ _________________
Signature of Parent Date

____
Printed Name of Parent

APPENDIX K

AIM 3 PARENTAL CONSENT FORM (SPANISH)

La Universidad de North Carolina-Chapel Hill
Autorización de los padres para que un hijo menor de edad participe en un estudio de investigación

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Nº del estudio del IRB: 08-1627
Fecha de la versión del formulario de consentimiento: April 23, 2009

Título del estudio: El impacto de la historieta cómica Manga con mensajes de salud con creencias de nutrición y actividad física.

Investigador principal: May May Leung, MS, RD
Departamento de la UNC-Chapel Hill: Nutrition, School of Public Health
Número telefónico de la UNC-Chapel Hill: 919.843.9466
Dirección de correo electrónico: mmleung@unc.edu
Supervisora de facultad: Alice Ammerman, DrPH, RD

Número telefónico del estudio: 919.843.9466
Dirección de correo electrónico del estudio: mmleung@unc.edu

¿Cuáles son algunas cosas generales que debes saber de una investigación?
Le pida a usted que permita que su niño participa en una investigación. Tomar parte del estudio es voluntario. Puede rehusar dar permiso, o puede retirar su permiso por cualquier razón. Incluso si da su permiso, su niño puede decidir no tomar parte en el estudio o dejar el estudio temprano.

Las investigaciones son diseñadas para obtener nueva información. Esta información puede ayudar gente en el futuro. Es posible que su niño no reciba ninguno beneficio directo de estar en el estudio. También, puede ser riesgos de tomar parte en investigaciones.

Los detalles sobre el estudio son discutidos abajo. Es importante que usted entienda que esta información es para que usted y su niño puedan hacer una decisión informada sobre su participación en el estudio. Va a recibir una copia de la forma de autorización. Usted y su niño deben preguntar la investigador principal mencionada arriba, cualquier pregunta que tiene del estudio en cualquier momento.

¿Cuál es el propósito de este estudio?
El propósito de este estudio es entender como diferente tipos de materiales de comunicación de salud pueden influir como piensa la juventud en nutrición y actividad física. Vamos a usar la información para ayudar a desarrollar materiales de comunicación de salud efectiva para mejorar el pensamiento de la juventud sobre nutrición.

¿Hay algunas razones por qué su niño no debe participar en el estudio?
Su niño no debe tomar parte del estudio si no puede participar en dos o tres sesiones de 45 minutos cada uno en una semana.

¿Cuántas personas van a participar en este estudio?
Si su niño está en el estudio, va a ser uno de aproximadamente 300 estudiantes participando en esta investigación.

¿Cuánto durará el parte del estudio de su niño?
Si su niño está en el estudio, le pidamos a él/ella asistir a dos o tres sesiones durante una semana. Cada sesión durará aproximadamente 45 minutos. El tiempo total de la participación no será más que 3 horas. Una vez que las dos o tres sesiones terminen, la participación de su niño en el estudio está completada. No hay una continuación.

¿Qué pasará si su niño participe en el estudio?
- En **Sesión 1** – Cuestionarios relajados a pensamientos de nutrición/actividad física, conocimiento y comportamientos serán completados.
- En **Sesión 2** – Su niño va a ser asignado al azar a uno de tres grupos. Asignación al azar significa que los participantes ser asignados al azar a grupos diferentes por casualidad, como echar cara o cruz.
    - *El Grupo 1* va a recibir una revista de mitología griega.
    - *El Grupo 2* va a recibir una revista de nutrición y actividad física.
    - *El Grupo 3* va a recibir una historieta cómica de nutrición y actividad física.
- En **Sesión 3** – Podemos pedir a su niño estar parte de una discusión de grupo. La discusión va a ser de materiales de comunicación de salud. La investigador principal es interesada en si su niño le gustó leer las materiales y cual ideas él/ella tiene para hacer materiales de salud mejor para la juventud.

La discusión de grupo será grabado por cinta de audio con permiso de su niño. Su niño tiene el derecho pedir parar la grabación o decir algo sin grabarlo. También su niño puede escoger no responder a cualquiera pregunta por cualquiera razón y/o parar participar cuando quiera.

¿Cuáles son los beneficios posibles de estar en este estudio?
Investigación es diseñada para beneficiar la sociedad por ganar información nueva. También usted puede esperar que su niño beneficie de estar en el estudio por tener la oportunidad de pensar y hablar de comportamientos personales de nutrición y activad física. Por participar en el estudio, su niño puede aumentar su motivación para comer saludable y/o estar más activa físicamente. También puede gozar leer y hablar de materiales de comunicación de salud.

¿Cuáles son los riesgos o malestares posibles de estar en el estudio?
Se requieren que los investigadores expliquen alguna problema posible que pueda causar su estudio. No es probable que este estudio vaya a causar alguna problema para su niño porque no hay riesgos sabidos para estar en este estudio. Una problema posible es la vergüenza durante la discusión del grupo. Participantes no tienen que discutir asuntos de que no se sienten cómodos y puede dejar el grupo en cualquier momento. Puede ser riesgos no comunes o no sabidos anteriormente. Debe informar la investigador de cualquier problema.

¿Cómo vamos a proteger la privacidad de su niño?
Vamos a hacer todo posible para proteger la privacidad de su niño. Durante la discusión del grupo, la confianza dentro del grupo va a ser acentuado y cada individuo tiene que estar de acuerdo no compartir detalles especificas de la discusión afuera de las sesiones del grupo. El nombre de su niño no va a aparecer en ningún documento de estudio, en vez un número de código, estará usado en documentos del estudio para proteger la confidencialidad del participante y prevenir conectar datos a los participantes. La lista que tiene los nombres y el número de código va a estar cerrado en un cabina. Su niño no tiene que usar su nombre real, si no quiere. Puede usar un nombre falso.

Cada dato y información estará guardado en un lugar cerrado en la oficina de la investigador principal.

Participantes no van a ser identificados en cualquier reporte o publicación de este estudio. Vamos hacer cada esfuerzo posible para guardar los datos privados, pero puede ser momentos cuando ley federal o del estado requiere acceso a los datos, incluso información personal. Eso no es muy probable, pero si acceso es necesario, UNC-Chapel Hill va a hacer lo más posible para proteger la privacidad de la información personal. En algunos casos, la información de su niño en este estudio será revisado por representantes de la Universidad, patrocinador de la investigación, o agencias gubernamentales para propósitos como el control de calidad o seguro.

¿Va a recibir algo su niño para su participación en el estudio?
Al final del estudio, su niño va a recibir materiales de la escuela o recuerdos de Manga (estimados a valor de $5) para participar en el estudio.

¿Le va a costar algo para que su niño esté parte del estudio?
No va a ser ningunos gastos para estar en el estudio excepto el tiempo de su niño y cualquier gastos de asistir a las sesiones en la escuela.

¿Qué pasa si usted o su niño tiene preguntas sobre este estudio?
A usted y su niño tienen el derecho preguntar, y tener respondidas, cualquiera pregunta ustedes puedan tener de esta investigación. Si tiene alguna pregunta o preocupación, debe contactar los investigadores de la primara pagina de este forma.

¿Qué pasa si usted o su niño tiene preguntas sobre los derechos de su niño como participante de investigación?
Cada investigación de voluntarios ser humanos son revisadas por un comité que trabaja para proteger los derechos de su niño. Si usted o su niño tiene preguntas o preocupaciones sobre los derechos de ser menor de edad y sujeto de investigación, puede contactar (puede hacerlo completamente anónimo) él “Institutional Review Board” (un comité examinador institucional) a 919-966-3113 o por email a IRB_subjects@unc.edu.

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Título del estudio: El impacto de la historieta cómica Manga con mensajes de salud con creencias de nutrición y actividad física.
Investigador principal: May May Leung, MS, RD

<u>Acuerdo de los padres</u>:

He leído la información proporcionada más arriba. He realizado todas las preguntas que tengo en este momento. Otorgo mi autorización voluntariamente para permitir que mi hijo participe en este estudio de investigación.

_____
Nombre del participante de la investigación en imprenta (hijo)

_____ _____
Firma del padre Fecha

_____
Nombre del padre en imprenta

APPENDIX L

AIM 3 STUDENT ASSENT FORM

University of North Carolina-Chapel Hill
Student Assent to participate in a health project (ages 10-15 years old)

IRB Study # 08-1627
Consent Form Version Date: April 23, 2009

Title of Study: Impact of a Manga comic with health messages on nutrition and physical activity beliefs

Person in charge of study: May May Leung, MS, RD
Where they work at UNC-Chapel Hill: Department of Nutrition; School of Public Health

Study contact phone number: 919.843.9466
Study contact Email Address: mmleung@unc.edu

The researcher from the University of North Carolina, Chapel Hill, North Carolina, is conducting a study on how different health communication materials affect youth's health.

These are some things we want you to know about research studies:
Your parent needs to give permission for you to be in this study. You do not have to be in this study if you don't want to, even if your parent has already given permission. You may stop being in the study at any time. If you decide to stop, no one will be angry or upset with you.

Sometimes good things happen to people who take part in studies, and sometimes things we may not like happen. We will tell you more about these things below.

Why are they doing this research study?
The reason for doing this research is to understand how different health communication materials can influence how youth think about nutrition and physical activity.

Why are you being asked to be in this research study?
Your school agreed to help us with this study.

How many people will take part in this study?
If you decide to be in this study, you will be one of about 300 people in this research study.

What will happen during this study?
If you agree to be in the study, we will ask you to come to school for two or three sessions over a one week period. Each session will last about 45 minutes long. The total participation time is no more than 3 hours.

- In session 1, you'll answer a questionnaire about diet and physical activity.
- In session 2, you'll read a communication material and then answer some more questions about your thoughts on diet and physical activity and whether or not you liked what you read.
- We may ask you to be a part of a group discussion during session 3. The discussion will be about communication materials. We are interested in whether or not you enjoyed reading the communication material and what ideas you have to make health materials better for youth.

We may tape record the group discussion, if that is okay with you.

Check the line that best matches your choice:
_____ OK to record me during the study
_____ Not OK to record me during the study

You can ask for the recording to be stopped at anytime or to say something without it being recorded. You may choose not to answer any question on any of the questionnaires for any reason and/or stop participation whenever you want.

This study will take place at your school and once the two or three sessions are over, your participation in the study is complete. There is no follow up.

Who will be told the things we learn about you in this study?
We will share what we learn from this project with other people, including other researchers, who want to understand about what youth think about different communication materials. We may share your answers from the questionnaires or thoughts from the discussion with these people, but we will not share your name with anyone.

What are the good things that might happen?
People may have good things happen to them because they are in research studies. These are called "benefits." The benefits to you of being in this study may be that by having the chance to think about and talk about personal nutrition and physical activity behaviors, it may make you want to eat more healthily and/or be more physically active. You may also enjoy reading and talking about the materials.

What are the bad things that might happen?
Sometimes things happen to people in research studies that may make them feel bad. These are called "risks." There are no known risks of this study, but it is possible that you might feel embarrassed to share your thoughts about the communication material. You

should tell a member of the research team or your teacher if something is bothering or upsetting you. We want to make sure this project doesn't cause you to feel bad in any way.

Not all of these things may happen to you. None of them may happen or things may happen that the researchers don't know about. You should report any problems to the researcher.

What if you or your parents don't want you to be in this study?

It is your choice to be in the study. If you or your parents don't want you to be in this study, you will not be affected in any way. You can also decide to stop participating at any time during the project.

Will you get any money or gifts for being in this research study?

At the end of the study, you will receive school supplies or Manga-related souvenirs (estimated $5 value) for taking part in this study.

Who should you ask if you have any questions?

If you have questions you should ask the people listed on the first page of this form. If you have other questions about your rights while you are in this research study, you may contact the Institutional Review Board at 919-966-3113 or by email to IRB_subjects@unc.edu.

Title of Study: Impact of a Manga comic with health messages on nutrition and physical activity beliefs

Principal Investigator: May May Leung, MS, RD

If you sign your name below, it means that you agree to take part in this research study.

_____ _____

Sign your name here if you want to be in the study Date

_____

Print your name here if you want to be in the study

_____ _____

Signature of Person Obtaining Assent Date

_____

Printed Name of Person Obtaining Assent

APPENDIX M

DAY 1 SURVEY

Name:
School:
Grade:
Class Period:
Date:
Session: 1

This short survey is about health. The answers you give will be kept private. Answer the questions based on what you really think or do. There are no right or wrong answers.

Completing the questionnaire is voluntary. If you're not comfortable answering a question, just leave it blank.

Make sure to read every question. Most questions can be answered by checking just one box. When you're finished, the person helping with the study will let you know what to do.

Thank you very much for your help!

Part 1: Some questions about you

1. When is your birthday?

Month_____ Day_____ Year_____

2. What is your sex?

☐ Female
☐ Male

3. What grade are you in?

☐ 6th grade
☐ 7th grade
☐ 8th grade
☐ Ungraded or other grade

4. What is your race? (You can check more than one box.)

☐ American Indian or Alaska Native
☐ Asian
☐ Black or African American
☐ Hispanic or Latino
☐ Native Hawaiian or Other Pacific Islander
☐ White

5. How do you describe your own weight?

☐ Very underweight
☐ Slightly underweight
☐ About the right weight
☐ Slightly overweight
☐ Very overweight

6. Compared to your classmates, how well do you do in school?

☐ Better than most of my classmates

☐ About the same as most of my classmates

☐ Worst than most of my classmates

The next questions are about Manga comics (Example: Naruto, Fruits Basket, Dragonball)

7. When was the last time you read or looked at a Manga comic?

☐ I do not read Manga comics

☐ Within the past 1 month

☐ Within the past 6 months

☐ More than 6 months ago

8. How often do you read or look at a Manga comic?

☐ I do not read Manga comics

☐ 1 time per week

☐ 1 time per month

☐ 1 time per year

Part 2: What do you usually eat?

1. During the past 7 days, how many times did you drink 100% fruit juices, such as orange juice, apple juice, or grape juice? *(Do not count punch, Kool-Aid, sports drinks, or other fruit-flavored drinks.)*

☐ I did not drink 100% fruit juice during the past 7 days

☐ 1 to 3 times during the past 7 days

☐ 4 to 6 times during the past 7 days

☐ 1 time per day

☐ 2 times per day

☐ 3 times per day

☐ 4 or more times per day

2. During the past 7 days, how many times did you eat fruit? *(Include fresh, frozen, canned and dried fruits. Do not count fruit juice.)*

☐ I did not eat fruit during the past 7 days

☐ 1 to 3 times during the past 7 days

☐ 4 to 6 times during the past 7 days

☐ 1 time per day

☐ 2 times per day

☐ 3 times per day

☐ 4 or more times per day

3. During the past 7 days, how many times did you eat green salad?

☐ I did not eat green salad during the past 7 days

☐ 1 to 3 times during the past 7 days

☐ 4 to 6 times during the past 7 days

☐ 1 time per day

☐ 2 times per day

☐ 3 times per day

☐ 4 or more times per day

4. During the past 7 days, how many times did you eat potatoes, such as baked or mashed potatoes? *(Do not count french fries, fried potatoes, or potato chips.)*

☐ I did not eat potatoes during the past 7 days

☐ 1 to 3 times during the past 7 days

☐ 4 to 6 times during the past 7 days

☐ 1 time per day

☐ 2 times per day

☐ 3 times per day

☐ 4 or more times per day

5. During the past 7 days, how many times did you eat carrots?

☐ I did not eat carrots during the past 7 days

☐ 1 to 3 times during the past 7 days

☐ 4 to 6 times during the past 7 days

☐ 1 time per day

☐ 2 times per day

☐ 3 times per day

☐ 4 or more times per day

6. During the past 7 days, how many times did you eat other vegetables? *(Do not count green salad, potatoes, or carrots.)*

☐ I did not eat other vegetables during the past 7 days

☐ 1 to 3 times during the past 7 days

☐ 4 to 6 times during the past 7 days

☐ 1 time per day

☐ 2 times per day

☐ 3 times per day

☐ 4 or more times per day

7. During the past 7 days, how many times did you drink a can, bottle, or glass of soda, such as Coke, Pepsi, or Sprite? *(Do not include diet soda.)*

☐ I did not drink soda during the past 7 days

☐ 1 to 3 times during the past 7 days

☐ 4 to 6 times during the past 7 days

☐ 1 time per day

☐ 2 times per day

☐ 3 times per day

☐ 4 or more times per day

8. During the past 7 days, how many glasses of milk did you drink? *(Include the milk you drank in a glass or cup, from a carton, or with cereal. Count the half pint of milk served at school as equal to one glass.)*

☐ I did not drink milk during the past 7 days

☐ 1 to 3 glasses during the past 7 days

☐ 4 to 6 glasses during the past 7 days

☐ 1 glass per day

☐ 2 glasses per day

☐ 3 glasses per day

☐ 4 or more glasses per day

Part 3: What do you usually do?

1. During the past 7 days, how many days were you physically active for a total of at least 60 minutes per day? *(Add up all the time you spend in any kind of physical activity that increases your heart rate and makes you breathe hard some of the time.)*

☐ 0 days

☐ 1 day

☐ 2 days

☐ 3 days

☐ 4 days

☐ 5 days

☐ 6 days

☐ 7 days

2. During the past 7 days, how many days were you physically active for a total of <u>at least 30 minutes</u> per day? *(Add up all the time you spend in any kind of physical activity that increases your heart rate and makes you breathe hard some of the time.)*

☐ 0 days
☐ 1 day
☐ 2 days
☐ 3 days
☐ 4 days
☐ 5 days
☐ 6 days
☐ 7 days

3. On an average <u>school day</u>, how many hours do you watch TV?

☐ I do not watch TV on an average school day
☐ Less than 1 hour per day
☐ 1 hour per day
☐ 2 hours per day
☐ 3 hours per day
☐ 4 hours per day
☐ 5 or more hours per day

4. On an average <u>weekend day</u>, how many hours do you watch TV?

☐ I do not watch TV on an average weekend day
☐ Less than 1 hour per day
☐ 1 hour per day
☐ 2 hours per day
☐ 3 hours per day
☐ 4 hours per day
☐ 5 or more hours per day

5. On an average school day, how many hours do you play video or computer games or use a computer for something that is not school work? *(Include activities such as Wii, PlayStation, Xbox, computer games, and the Internet.)*

- ☐ I do not play video or computer games or use a computer for something that is not school work
- ☐ Less than 1 hour per day
- ☐ 1 hour per day
- ☐ 2 hours per day
- ☐ 3 hours per day
- ☐ 4 hours per day
- ☐ 5 or more hours per day

6. On an average weekend day, how many hours do you play video or computer games or use a computer for something that is not school work? *(Include activities such as Wii, PlayStation, Xbox, computer games, and the Internet.)*

- ☐ I do not play video or computer games or use a computer for something that is not school work
- ☐ Less than 1 hour per day
- ☐ 1 hour per day
- ☐ 2 hours per day
- ☐ 3 hours per day
- ☐ 4 hours per day
- ☐ 5 or more hours per day

7. In an average week when you are in school, how many days do you go to physical education (PE) classes?

- ☐ 0 days
- ☐ 1 day
- ☐ 2 days
- ☐ 3 days
- ☐ 4 days
- ☐ 5 days

8. In a typical physical education (PE) class, about how long do you participate in physical activity?

☐ 10 minutes

☐ 20 minutes

☐ 30 minutes

☐ 40 minutes

☐ 50 minutes

9. During the past 12 months, how many sports teams did you play on? *(Include any teams run by your school or community groups.)*

☐ 0 teams

☐ 1 team

☐ 2 teams

☐ 3 or more teams

Please let us know to what extent you agree with these statements:
Check a box for each line.

	Strongly Disagree	Disagree Somewhat	Agree Somewhat	Strongly Agree	Neither disagree or agree
Eating fruit everyday makes me feel good.	☐	☐	☐	☐	☐
Only fresh fruits count toward my daily recommended intake of fruit.	☐	☐	☐	☐	☐
Milk is a good source of protein.	☐	☐	☐	☐	☐
I like to eat fruit.	☐	☐	☐	☐	☐
Drinking fruit juice is just as good for me as eating real fruit.	☐	☐	☐	☐	☐
Fruits have high amounts of vitamin C.	☐	☐	☐	☐	☐
It is difficult for me to eat fruit every day.	☐	☐	☐	☐	☐
I like tasting new fruits.	☐	☐	☐	☐	☐
Fruits do not contain much water.	☐	☐	☐	☐	☐
Most people my age eat enough fruit servings a day for good health.	☐	☐	☐	☐	☐
Fruit tastes good.	☐	☐	☐	☐	☐
If I decide to eat fruit every day, I can do it.	☐	☐	☐	☐	☐
I like to drink soda.	☐	☐	☐	☐	☐
Fruits have phytochemicals, which give them their bright colors.	☐	☐	☐	☐	☐
My best friend eats fruit every day.	☐	☐	☐	☐	☐
Eating fruit everyday gives me more energy.	☐	☐	☐	☐	☐
Potato chips count toward my daily recommended intake of vegetables.	☐	☐	☐	☐	☐
I would taste a fruit if it looks strange.	☐	☐	☐	☐	☐
I want to eat fruit every day.	☐	☐	☐	☐	☐
Fruits are an important source of fiber.	☐	☐	☐	☐	☐
People my age should eat 1 to 2 servings of fruit each day for good health.	☐	☐	☐	☐	☐
Compared to all the different foods people my age eat, I think fruit is 'cool'.	☐	☐	☐	☐	☐
I would try a fruit that I have never tasted before.	☐	☐	☐	☐	☐

THIS IS THE END OF THE QUESTIONNAIRE

☺ ***Thank you very much for your help!*** ☺

APPENDIX N

AIM 3 DAY 2 SURVEY

Name:
School:
Grade:
Class Period:
Date:
Session: 2
Group: 3

Please answer this questionnaire based on the comic you just read. The answers you give will be kept private. There are no right or wrong answers.

Completing the questionnaire is voluntary. If you are not comfortable answering a question, just leave it blank.

Make sure to read every question. Most questions can be answered by checking just one box. When you're finished, the person helping with the study will let you know what to do.

Thank you very much for your help!

Please read each statement, then check the box that describes how you felt <u>while reading the comic</u>.

	Not At All	A Little	Some	Quite A Bit	A Lot
While I was reading the comic, I could easily picture the events in it taking place.	☐	☐	☐	☐	☐
I was more interested in what my classmates were doing than reading the comic.	☐	☐	☐	☐	☐
I could picture myself in the scene of the events described in the comic.	☐	☐	☐	☐	☐
I was mentally involved in the comic while reading it.	☐	☐	☐	☐	☐
After finishing the comic, I found it easy to put it out of my mind.	☐	☐	☐	☐	☐
I wanted to learn how the comic ended.	☐	☐	☐	☐	☐
The comic affected me emotionally.	☐	☐	☐	☐	☐
I found myself thinking of ways the comic could have turned out differently.	☐	☐	☐	☐	☐
I found my mind wandering while reading the comic.	☐	☐	☐	☐	☐
The events in the comic are relevant to my everyday life.	☐	☐	☐	☐	☐
The events in the comic have changed my life.	☐	☐	☐	☐	☐
While reading the comic, I had a vivid image of Kenzo.	☐	☐	☐	☐	☐
While reading the comic, I felt as if I was part of the action.	☐	☐	☐	☐	☐
I was able to understand the events in the comic in a way similar to the way Kenzo understood them.	☐	☐	☐	☐	☐
I think I have a good understanding of Kenzo.	☐	☐	☐	☐	☐
I tend to understand the reason why Kenzo does what he does.	☐	☐	☐	☐	☐
While reading the comic, I could feel the emotions Kenzo portrayed.	☐	☐	☐	☐	☐
During reading, I felt I could really get inside Kenzo's head.	☐	☐	☐	☐	☐
I felt I knew exactly what Kenzo was going through at key moments in the comic.	☐	☐	☐	☐	☐
While reading the comic, I wanted Kenzo to succeed in achieving his goals.	☐	☐	☐	☐	☐
When Kenzo succeeded I felt joy, but when he failed, I was sad.	☐	☐	☐	☐	☐
I want to be like Kenzo.	☐	☐	☐	☐	☐
Kenzo does things that I would like to do.	☐	☐	☐	☐	☐
I had a good time reading the comic.	☐	☐	☐	☐	☐
The comic was entertaining.	☐	☐	☐	☐	☐

Please let us know to what extent you agree with these statements:
Check a box for each line.

	Strongly Disagree	Disagree Some-what	Agree Some-what	Strongly Agree	Neither disagree or agree
Eating fruit everyday makes me feel good.	☐	☐	☐	☐	☐
Only fresh fruits count toward my daily recommended intake of fruit.	☐	☐	☐	☐	☐
Milk is a good source of protein.	☐	☐	☐	☐	☐
I like to eat fruit.	☐	☐	☐	☐	☐
Drinking fruit juice is just as good for me as eating real fruit.	☐	☐	☐	☐	☐
Fruits have high amounts of vitamin C.	☐	☐	☐	☐	☐
It is difficult for me to eat fruit every day.	☐	☐	☐	☐	☐
I like tasting new fruits.	☐	☐	☐	☐	☐
Fruits do not contain much water.	☐	☐	☐	☐	☐
Most people my age eat enough fruit servings a day for good health.	☐	☐	☐	☐	☐
Fruit tastes good.	☐	☐	☐	☐	☐
If I decide to eat fruit every day, I can do it.	☐	☐	☐	☐	☐
I like to drink soda.	☐	☐	☐	☐	☐
Fruits have phytochemicals, which give them their bright colors.	☐	☐	☐	☐	☐
My best friend eats fruit every day.	☐	☐	☐	☐	☐
Eating fruit everyday gives me more energy.	☐	☐	☐	☐	☐
Potato chips count toward my daily recommended intake of vegetables.	☐	☐	☐	☐	☐
I would taste a fruit if it looks strange.	☐	☐	☐	☐	☐
I want to eat fruit every day.	☐	☐	☐	☐	☐
Fruits are an important source of fiber.	☐	☐	☐	☐	☐
People my age should eat 1 to 2 servings of fruit each day for good health.	☐	☐	☐	☐	☐
Compared to all the different foods people my age eat, I think fruit is ‘cool’.	☐	☐	☐	☐	☐
I would try a fruit that I have never tasted before.	☐	☐	☐	☐	☐

Please read each statement, then check the box that describes how you felt <u>while reading the comic</u>.

	Not At All	A Little	Some	Quite A Bit	A Lot
The topic of nutrition is important to me personally.	☐	☐	☐	☐	☐
I was motivated to read the comic.	☐	☐	☐	☐	☐
I tried hard to think about the information in the comic.	☐	☐	☐	☐	☐
The information in the comic held my attention.	☐	☐	☐	☐	☐
I gave much effort to evaluate the information in the comic.	☐	☐	☐	☐	☐
I had enough time to think about the information in the comic.	☐	☐	☐	☐	☐
The information in the comic was well-organized and easy to follow.	☐	☐	☐	☐	☐
The information in the comic was logical and accurate.	☐	☐	☐	☐	☐
The comic made good points about nutrition.	☐	☐	☐	☐	☐
The information in the comic was difficult to understand.	☐	☐	☐	☐	☐
I felt distracted from thinking about nutrition when reading the comic.	☐	☐	☐	☐	☐
	Poor	Fair	Okay	Good	Excellent
Rate the quality of information in the comic.	☐	☐	☐	☐	☐

This page consists of words that describe different feelings and emotions. Please read each item, then check the box that describes how you felt <u>while reading the comic</u>.

	Not At All	A Little	Some	Quite A Bit	A Lot
Interested	☐	☐	☐	☐	☐
Sad	☐	☐	☐	☐	☐
Frightened	☐	☐	☐	☐	☐
Alert	☐	☐	☐	☐	☐
Excited	☐	☐	☐	☐	☐
Ashamed	☐	☐	☐	☐	☐
Upset	☐	☐	☐	☐	☐
Happy	☐	☐	☐	☐	☐
Strong	☐	☐	☐	☐	☐
Nervous	☐	☐	☐	☐	☐
Guilty	☐	☐	☐	☐	☐
Energetic	☐	☐	☐	☐	☐
Scared	☐	☐	☐	☐	☐
Calm	☐	☐	☐	☐	☐
Miserable	☐	☐	☐	☐	☐
Jittery	☐	☐	☐	☐	☐
Cheerful	☐	☐	☐	☐	☐
Active	☐	☐	☐	☐	☐
Proud	☐	☐	☐	☐	☐
Afraid	☐	☐	☐	☐	☐
Joyful	☐	☐	☐	☐	☐
Lonely	☐	☐	☐	☐	☐
Mad	☐	☐	☐	☐	☐
Fearless	☐	☐	☐	☐	☐
Disgusted	☐	☐	☐	☐	☐
Delighted	☐	☐	☐	☐	☐
Blue	☐	☐	☐	☐	☐
Daring	☐	☐	☐	☐	☐
Gloomy	☐	☐	☐	☐	☐
Lively	☐	☐	☐	☐	☐

THIS IS THE END OF THE QUESTIONNAIRE

☺ ***Thank you very much for your help!*** ☺

APPENDIX O

AIM 3 POST-INTERVENTION EVALUATION MODERATOR'S GUIDE

Phase 2: Moderator's Guide

** Distribute the comic/NL to each student **

INTRODUCTION

Hi everyone! My name is _____. Thanks again for your help! We really appreciate it! This is the last day of the study. Today we'll be having a discussion about the Manga comic/Nutrition newsletter (NL) you read last week.

I'd like to record the discussion today to make sure I don't miss any of your comments, just because I can't write as fast as you guys talk. If you want to make a comment that you don't want recorded, just tell me and I'll turn it off and re-start it when you finish making your comment.

START RECORDING

*Feel free to share your ideas and opinions even if they are different from others. All opinions and ideas are **very** important. So, let's begin.*

Overall reaction and message (15 minutes)

- Did you think the comic/NL was enjoyable? If so, what did you enjoy about it?
- What do you think the main message or idea in this comic/NL is?
- What gave you that idea?
- What do you think about that message?
- Are there any other messages you get from this comic/NL?
- Are these messages important to you?
- Why? If not, why is/are the message(s) not important to you?
- Was the comic/NL funny?
- Which parts of the comic/NL did you find:
  - Funny
  - Sad
  - Boring

Likes (5 minutes)

- What do you like about the comic/NL? Why?
- What is the best part of it?
- Which characters did you like? Why?

Dislikes (5 minutes)

- What, if anything, do you not like about this comic/NL?
- Is there anything confusing or hard to understand?
- What could be improved with the comic/NL?

Relevance (5 minutes)

- Did this comic/NL include activities that you do or would like to do? If so, what are those activities?
    - If not, what types of activities would you like to see included?
- Any parts of the comic/NL similar to your own life?

Motivation (5 minutes)

- Does this comic/NL make you want to do anything? If yes, what does it make you want to do?
- What is it in the comic/NL that makes you feel that way?

THAT WAS THE LAST QUESTION. YOU GUYS ARE DONE! WE HAVE A LITTLE SOMETHING TO SAY THANKS FOR YOUR HELP.

YOU NEED TO FIRST SIGN THE FORM AND THEN COME CHOOSE YOUR GIFTS.

REFERENCES

Allen, M., & Preiss, R. W. (1997). Comparing persuasiveness of narrative and statistical evidence using meta-analysis. *Communication Research Reports,* 14(2), 125-131.

American Library Association. (2001). *Teen Read Week/SmartGirl.com Teen reading survey results.* Retrieved January 31, 2010 from http://www.smartgirl.org/speakout/archives/trw/trw2001.html

Baesler, E. J., & Burgoon, J. K. (1994). The temporal effects of story and statistical evidence on belief change. *Communications Research,* 21(5), 582-602.

Bank, S. (1986). Assessing reading interests of adolescent students. *Educational Research Quarterly,* 10(3), 8-13

Baranowski, T., Perry, C. L., & Parcel, G. S. (2002). How individuals, environments, and health behavior interact: Social cognitive theory. In K. Glanz, B. K. Rimer & F. M. Lewis (Eds.), *Health behavior and health education: Theory, research, and practice* (Third ed., pp. 165-184). San Francisco, CA: Jossey-Bass.

Barlow, S. E., & Expert Committee. (2007). Expert committee recommendations regarding the prevention, assessment, and treatment of child and adolescent overweight and obesity: Summary report. *Pediatrics, 120 Suppl 4*, S164-92.

Bell, R., Berger, C., & Townsend, M. (2003). *Portrayals of nutritional practices and exercise behavior in popular American films, 1991-2000*. Davis, CA: Center for Advanced Studies of Nutrition and Social Marketing, University of California.

Bere, E., & Klepp, K. I. (2004). Correlates of fruit and vegetable intake among norwegian schoolchildren: Parental and self-reports. *Public Health Nutrition,* 7(8), 991-998. doi:10.1079/PHN2004619

Berfield, S. (2008). Career advice from a comic book: Graphic books on business are already a hit in Japan. With Johnny Bunko, the genre heads for the U.S. *Business Week,* 4073, 73.

Berkey, C. S., Rockett, H. R., Field, A. E., Gillman, M. W., & Colditz, G. A. (2004). Sugar-added beverages and adolescent weight change. *Obesity Research,* 12(5), 778-788.

Berliner, D. C. (1990). What's all the fuss about instructional time? *The nature of time in schools: Theoretical concepts, practitioner perceptions*. New York, NY: Teachers College Press.

Byrd-Bredbenner, C., Finckenor, M., & Grasso, D. (2003). Health related content in prime-time television programming. *Journal of Health Communication, 8*, 329-341.

Calvert, S. L., Murray, K. J., & Conger, E. E. (2004). Heroic DVD portrayals: What US and Taiwanese adolescents admire and understand. *Journal of Applied Developmental Psychology, 2*5, 699-716.

Campbell, M. K., Carbone, E., Honess-Morreale, L., Heisler-Mackinnon, J., Demissie, S., & Farrell, D. (2004). Randomized trial of a tailored nutrition education CD-ROM program for women receiving food assistance. *Journal of Nutrition Education and Behavior,* 36(2), 58-66.

Campbell, M. K., Honess-Morreale, L., Farrell, D., Carbone, E., & Brasure, M. (1999). A tailored multimedia nutrition education pilot program for low-income women receiving food assistance. *Health Education Research,* 14(2), 257-267.

Cawley, J. (2010). The economics of childhood obesity. *Health Affairs,* 29(3), 364-371.

Centers for Disease Control and Prevention. (2007). *YRBSS: Youth risk behavior surveillance system, 2007*. Retrieved April 6, 2009 from http://www.cdc.gov/HealthyYouth/yrbs/

Chiu, L. H. (1984). Children's attitudes toward reading and reading interests. *Perceptual and Motor Skills, 5*8(3), 906-962.

Christie, D. (2005). ABC of adolescence: Adolescent development. *British Medical Journal, 33*0(7486), 301-304.

Cohen, J. (2001). Definining identification: A theoretical look at the identification of audiences with media characters. *Mass Communication & Society,* 4(3), 245-264.

Cohen, J. (2006). Audience identification with media characters. In P. Vorderer (Ed.), *Psychology of entertainmen*t (pp. 183). Mahway, N.J.: Lawrence Erlbaum.

Daniels, S. R. (2006). *The consequences of childhood overweight and obesity*. Retrieved June 29, 2008 from http://www.futureofchildren.org/information2826/information_show.htm?doc_id=355235

De Bourdeaudhuij, I., Klepp, K. I., Due, P., Rodrigo, C. P., de Almeida, M., Wind, M., et al. (2005). Reliability and validity of a questionnaire to measure personal, social and environmental correlates of fruit and vegetable intake in 10-11-year-old children in five european countries. *Public Health Nutrition,* 8(2), 189-200.

Doak, C. M., Visscher, T. L., Renders, C. M., & Seidell, J. C. (2006). The prevention of overweight and obesity in children and adolescents: A review of interventions and programmes. *Obesity Reviews: An Official Journal of the International Association for the Study of Obesity,* 7(1), 111-136.

Domel, S. B., Thompson, W. O., Davis, H. C., Baranowski, T., Leonard, S. B., & Baranowski, J. (1996). Psychosocial predictors of fruit and vegetable consumption among elementary school children. *Health Education Research,* 11, 299-308.

Escobar-Chaves, S. L., & Anderson, C. A. (2008). Media and risky behaviors. *Future Child,* 18, 147-180.

Field, A. E. (2008). Predictors and consequences of childhood obesity. *Obesity epidemiology* (pp. 416-436) Oxford University Press.

Fulkerson, J. A., Story, M., Mellin, A., Leffert, N., Neumark-Sztainer, D., & French, S. A. (2006). Family dinner meal frequency and adolescent development: Relationships with developmental assets and high-risk behaviors. *The Journal of Adolescent Health: Official Publication of the Society for Adolescent Medicine,* 39(3), 337-345.

Gillman, M. W., Rifas-Shiman, S. L., Frazier, A. L., Rockett, H. R., Camargo, C. A., Field, A. E., et al. (2000). Family dinner and diet quality among older children and adolescents. *Archives of Family Medicine,* 9(3), 235-240.

Gordon-Larsen, P., Adair, L. S., & Popkin, B. M. (2003). The relationship of ethnicity, socioeconomic factors, and overweight in US adolescents. *Obesity Research,* 11(1), 121-129.

Gortmaker, S. L., Must, A., Sobol, A. M., Peterson, K., Colditz, G. A., & Dietz, W. H. (1996). Television viewing as a cause of increasing obesity among children in the united states, 1986-1990. *Archives of Pediatrics & Adolescent Medicine,* 150(4), 356-362.

Green, M. C. (2006). Narratives and cancer communication. *Journal of Communication, 5*6, S163-S183.

Green, M. C., & Brock, T. C. (2000). The role of transportation in the persuasiveness of public narratives. *Journal of Personality and Social Psychology,* 79(5), 701-721.

Green, M. C., & Brock, T. C. (2002). In the mind's eye: Transportation-imagery model of narrative persuasion. In M. C. Green, J. J. Strange & T. C. Brock (Eds.), *Narrative impact: Social and cognitive foundation*s (pp. 315-341). Mahwah, NJ: Lawrence Erlbaum.

Green, M. C., Garst, J., & Brock, T. C. (2004). The power of fiction: Determinants and boundaries. In L. M. Shrum (Ed.), *The psychology of entertainment medi*a (pp. 161-176). Mahwah, NJ: Lawrence Erlbaum.

Gregory, W. L., Cialdini, R. B., & Carpenter, K. M. (1982). Self-relevant scenarios as mediators of likelihood estimates and compliance. *Journal of Personality and Social Psychology,* 43(1), 89-99.

Guo, S. S., & Chumlea, W. C. (1999). Tracking of body mass index in children in relation to overweight in adulthood. *The American Journal of Clinical Nutrition, 7*0(1), 145S-8S.

Guo, S. S., Chumlea, W. C., Roche, A. F., & Siervogel, R. M. (1998). Age- and maturity-related changes in body composition during adolescence into adulthood: The fels longitudinal study. *International Journal of Obesity,* 49(5-6), 581-585.

Gillies, V., Ribbens McCarthy, J., & Holland, J. (2001). *Pulling together, pulling apart: The family lives of young people*. London: Family Policy Studies Centre/Joseph Rowntree Foundation.

Hinyard, L. J., & Kreuter, M. W. (2007). Using narrative communication as a tool for health behavior change: A conceptual, theoretical, and empirical overview. *Health Education & Behavior,* 34(5), 777-792.

Hodder, & Stoughton. (2007). *The manga bible*. Retrieved July 25, 2008 from http://www.themangabible.com/index.asp?module=Pages&action=List

Hoffner, C. (1996). Children's wishful identification and parasocial interaction with favorite television characters. *Journal of Broadcasting and Electronic Media,* 40, 389-402.

Ito, K. (2005). A history of manga in the context of japanese culture and society. *The Journal of Popular Culture,* 38(3), 456-475.

Jago, R., Baranowski, T., Baranowski, J. C., Thompson, D., Cullen, K. W., Watson, K., et al. (2006). Fit for life boy scout badge: Outcome evaluation of a troop and internet intervention. *Preventive Medicine,* 42(3), 181-187.

James, J., Thomas, P., Cavan, D., & Kerr, D. (2004). Preventing childhood obesity by reducing consumption of carbonated drinks: Cluster randomised controlled trial. *BMJ (Clinical Research Ed.),* 328(7450), 1237.

Johnson, L., Mander, A. P., Jones, L. R., Emmett, P. M., & Jebb, S. A. (2008). Energy-dense, low-fiber, high-fat dietary pattern is associated with increased fatness in childhood. *American Journal of Clinical Nutrition,* 87, 846-854.

Kaplan. (2007). *"KABOOM!" "SLAM!" and "ARRGH!" supplemented by "ERADICATE!" "RELINQUISH!" and "ILLUMINATE!": Kaplan and TOKYOPOP release action-packed manga graphic novel series with vocabulary-building SAT and ACT words*. Retrieved June 16, 2008 from http://www.kaplan.com/aboutkaplan/pressreleases/jun+14+-+ktpa+manga.htm

Knowles, E. S., & Linn, J. (2004). *Resistance and persuasio*n. Mahwah, NJ: Lawrence Erlbaum.

Kristjansdottir, A. G., Thorsdottir, I., De Bourdeaudhuij, I., Due, P., Wind, M., & Klepp, K. I. (2006). Determinants of fruit and vegetable intake among 11-year-old schoolchildren in a country of traditionally low fruit and vegetable consumption. *The International Journal of Behavioral Nutrition and Physical Activity,* 3, 41. doi:10.1186/1479-5868-3-41

Leslie, J., Yancy, A., McCarthy, W., Albert, S., Wert, C., Miles, O., et al. (1999). Development and implementation of a school-based nutrition and fitness promotion program for ethnically diverse middle-school girls. *Journal of the American Dietetic Association,* 99(8), 967-970. doi:10.1016/S0002-8223(99)00230-8

Leung, M. M., Brown, J., Cai, J., Campbell, M., Green, M., Ivey, L., Tate, D., Ammerman, A. (2010). *"He'd be a trouble maker, but would have a heart of gold.":* Formative research for development of a Manga comic promoting healthy eating in youth. Unpublished manuscript.

Lu, A. S. (2009). What race do they represent and does mine have anything to do with it? perceived racial categories of anime characters. *Anime: An Interdisciplinary Journal,* 4(2), 169-190.

Ludwig, D. S., Peterson, K. E., & Gortmaker, S. L. (2001). Relation between consumption of sugar-sweetened drinks and childhood obesity: A prospective, observational analysis. *Lancet,* 357(9255), 505-508.

Lytle, L., & Achterberg, C. (1995). Changing the diet of america's children: What works and why*? Journal of Nutrition Education,* 27, 250-260.

Mathios, A., Avery, R., Bisogni, C., & Shanahan, J. (1998). Alcohol portrayal on prime-time television: Manifest and latent messages. *Journal of Studies on Alcohol,* 59(3), 305-310.

McCloud, S. (1994). In Martin M. (Ed.), *Understanding comics: The invisible ar*t. New York, NY: HarperCollins Publishers, Inc.

Mikkila, V., Rasanen, L., Raitakari, O. T., Pietinen, P., & Viikari, J. (2004). Longitudinal changes in diet from childhood into adulthood with respect to risk of cardiovascular diseases: The cardiovascular risk in young finns study. *European Journal of Clinical Nutrition,* 58(7), 1038-1045. doi:10.1038/sj.ejcn.1601929

Moser, R. P., Green, V., Weber, D., & Doyle, C. (2005). Psychosocial correlates of fruit and vegetable consumption among African American men. *Journal of Nutrition Education and Behavior,* 37(6), 306-314.

Nader, P. R., Bradley, R. H., Houts, R. M., McRitchie, S. L., & O'Brien, M. O. (2008). Moderate-to-vigorous physical activity from ages 9 to 15 years. *JAMA : The Journal of the American Medical Association,* 300(3), 295-305.

Neuendorf, K.A. (2002). *The content analysis guidebook.* Thousand Oaks, CA: Sage Publications.

Neumark-Sztainer, D., Hannan, P. J., Story, M., & Croll, J. (2003). Family meal patterns: Associations with sociodemographic characteristics and improved dietary intake in adolescents. *Journal of the American Dietetic Association,* 107(9), 1498-1501.

Oatley, K. (2002). Emotions and the story worlds of fiction. In M. C. Green, J. J. Strange & T. C. Brock (Eds.), *Narrative impact: Social and cognitive foundations* (pp. 39-69). Mahwah, NJ: Lawrence Erlbaum.

Ogden, C. L., Carroll, M. D., Curtin, L. R., McDowell, M. A., Tabak, C. J., & Flegal, K. M. (2006). Prevalence of overweight and obesity in the United States, 1999-2004. *The Journal of the American Medical Association,* 295(13), 1549-1555.

Parsons, S., Rissel, C., & Douglas, W. (1999). Alcohol portrayal in australian prime time television in 1990 and 1997. *Australian and New Zealand Journal of Public Health,* 23(1), 67-71.

Piernas, C. M., & Popkin, B. M. (2010). Trends in snacking among U.S. children. *Health Affairs,* 29(3), 398-404.

Quintiliani, L. M., & Carbone, E. T. (2005). Impact of diet-related cancer prevention messages written with cognitive and affective arguments on message characteristics, stage of change, and self-efficacy. *Journal of Nutrition Education and Behavior,* 37(1), 12-19.

Resnicow, K., Davis-Hearn, M., Smith, M., Baranowski, T., Lin, L. S., Baranowski, J., et al. (1997). Social-cognitive predictors of fruit and vegetable intake in children. *Health Psychology : Official Journal of the Division of Health Psychology, American Psychological Association,* 16(3), 272-276.

Resnicow, K., Smith, M., Baranowski, T., Baranowski, J., Vaughan, R., & Davis, M. (1998). Two-year tracking of children's fruit and vegetable intake. *Journal of the American Dietetic Association,* 98, 785-789.

Reynolds, K., Hinton, A., Shewchuck, R., & Hickey, C. (1999). Social cognitive model of fruit and vegetable consumption in elementary school children. *Journal of Nutrition Education and Behavior,* 31, 23-30.

Robb, M. (2007). Relating. In M. J. Kehily (Ed.), *Understanding youth : Perspectives, identities and practice*s (pp. 313-344). London ;Thousand Oaks, Calif.; Milton Keynes England: SAGE; In association with The Open University. Retrieved from http://search.lib.unc.edu.libproxy.lib.unc.edu?R=UNCb5186141

Robbins, L. B., Pender, N. J., & Kazanis, A. S. (2003). Barriers to physical activity perceived by adolescent girls. *Journal of Midwifery & Women's Health,* 48(3), 206-212.

Rogers, E. M., Vaughan, P. W., Swalehe, R. M. A., Rao, N., Svenkerud, P., & Sood, S. (1999). Effects of an entertainment-education radio soap opera on family planning behavior in Tanzania. *Studies in Family Planning,* 30(3), 193-211.

Rolland-Cachera, M. F., Bellisle, F., & Sempe, M. (1989). The prediction in boys and girls of the weight/height index and various skinfold measurements in adults: A two-decade follow-up study. *International Journal of Obesity,* 13(3), 305-311.

Saland, J. M. (2007). Update on the metabolic syndrome in children. *Current Opinion in Pediatrics,* 19(2), 183-191.

Schank, R. C., & Berman, T. R. (2002). The pervasive role of stories in knowledge and action. In M.C. Green, J.J. Strange, T.C. Brock (Ed.), *Narrative impact: Social and cognitive foundations* (pp. 287-313). Mahwah, NJ: Lawrence Erlbaum.

Schunk, D. H. (1986). Vicarious influences on self-efficacy for cognitive skill learning. *Journal of Social and Clinical Psychology,* 4(3), 316-327.

Slater, M. D., Buller, D. B., Waters, E., Archibeque, M., & LeBlanc, M. (2003). A test of conversational and testimonial messages versus didactic presentations of nutrition information. *Journal of Nutrition Education and Behavior,* 35, 255-259.

Slater, M. D., & Rouner, D. (1996). Value-affirmative and value-protective processing of alcohol education messages that include statistical evidence or anecdotes. *Communication Research,* 23, 210-235.

Slater, M. D., & Rouner, D. (2002). Entertainment-education and elaboration likelihood: Understanding the processing of narrative persuasion. *Communication Research,* 12(2), 210-235.

Smith, R. C. (1962). Children's reading choices and basic reader content. *Elementary English,* 39(3), 202-209.

Steptoe, A., Perkins-Porras, L., Rink, E., Hilton, S., & Cappuccio, F. P. (2004). Psychological and social predictors of changes in fruit and vegetable consumption over 12 months following behavioral and nutrition education counseling. *Health Psychology : Official Journal of the Division of Health Psychology, American Psychological Association,* 23(6), 574-581. doi:10.1037/0278-6133.23.6.574

Strange, J. J., & Leung, C. C. (1999). How anecdotal accounts in news and in fiction can influence judgements of a social problem's urgency, causes, and cures. *Personality and Social Psychology Bulletin,* 25(4), 436-449.

Sturm, B. W. (2003). The information and reading preferences of North Carolina children. *School Library Media Research,* 6. Retrieved February 18, 2010 from www.ala.org/ala/aasl/aaslpubsandjournals/slmrb/slmrcontents/volume62003/readingpreferences.cfm

The Annie E. Casey Foundation. (2008) *Percent of Children enrolled in Free and Reduced Lunch in North Carolina) – 2007*. Retrieved July 4, 2010, from http://datacenter.kidscount.org/data/bystate/Map.aspx?state=NC&ind=2239

The Nielsen Company. (2010). *Nielsen BookScan.* Retrieved March 31, 2010, from http://en-us.nielsen.com.libproxy.lib.unc.edu/tab/industries/media/entertainment

Thomas, H. (2006). Obesity prevention programs for children and youth: Why are their results so modest*? Health Education Research,* 21(6), 783-795.

Thompson, J. (2007). *Manga: The complete guid*e. New York, NY: Del Rey Books.

Trasande, L., Liu, Y., Fryer, G., & Weitzman, M. (2009). Effects of childhood obesity on hospital care and costs, 1999-2005. *Health Affairs (Project Hope), 2*8(4), w751-60. doi:10.1377/hlthaff.28.4.w751

Ulin, P. R., Robinson, E. T., & Tolley, E. E. (2005). Collecting qualitative data: The science and art. *Qualitative methods in public health: A field guide for applied researc*h (pp. 71-114). San Francisco, CA: Jossey-Bass.

U.S. Department of Education, National Center for Education Statistics, Common Core of Data, (2007) *Percent of free lunch or reduced-price lunch eligible students.*

U.S. Department of Health and Human Services. (2000). *Healthy people 201*0. Washington DC: US Government Printing Office.

Van Duyn, M. A., Kristal, A. R., Dodd, K., Campbell, M. K., Subar, A. F., Stables, G., et al. (2001). Association of awareness, intrapersonal and interpersonal factors, and stage of dietary change with fruit and vegetable consumption: A national survey. *American Journal of Health Promotion,* 16(2), 69-78.

Videon, T. M., & Manning, C. K. (2003). Influences on adolescent eating patterns: The importance of family meals. *The Journal of Adolescent Health: Official Publication of the Society for Adolescent Medicine,* 32(5), 365-373.

Whitaker, R. C., Wright, J. A., Pepe, M. S., Seidel, K. D., & Dietz, W. H. (1997). Predicting obesity in young adulthood from childhood and parental obesity. *The New England Journal of Medicine,* 337(13), 869-873.

Wind, M., de Bourdeaudhuij, I., te Velde, S. J., Sandvik, C., Due, P., Klepp, K. I., et al. (2006). Correlates of fruit and vegetable consumption among 11-year-old Belgian-

Flemish and Dutch schoolchildren. *Journal of Nutrition Education and Behavior,* 38(4), 211-221. doi:10.1016/j.jneb.2006.02.011

Zephier, E., Himes, J. H., Story, M., & Zhou, X. (2006). Increasing prevalences of overweight and obesity in northern plains American Indian children. *Archives of Pediatrics & Adolescent Medicine,* 160(1), 34-39.