To what extent do the student demographics at a private independent high school impact their school store snacking habits?

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Introduction

Background

As global obesity rates have doubled since 1980, and childhood obesity rates in America have tripled since 1970 (Harvard, 2022), measures have been taken to understand what has caused this global health pandemic. Researchers have related this trend to the increased availability of unhealthy diet options, a decrease in exercise, and an overall lack of food literacy (Stanford Medicine, 2022).

Food literacy has been defined as the ability to interconnect knowledge about health, preparation, environmental effects, and nutrition related to the foods one eats (Azevedo-Perry et al., 2022). This concept has fueled recent educational programs to lessen obesity rates, especially for children because of the increasing prevalence of childhood obesity (United States Department of Agriculture [USDA], 2022). The USDA's Food and Nutrition Service (2022) has taken the most notable action to educate students in schools by setting healthy eating guidelines for schools.

These programs have brought about research that points out the importance of the dieting habits of students. Students who do not make good decisions with their food are more inclined to be overweight or obese and perform worse in their academics (Leach et al., 1991), bringing urgency to understanding the snacking habits of students at school. Thus, the purpose of this survey research is to determine the common school store snacking habits by age and gender at a private, independent high school. This contributes to a growing body of literature surrounding teenagers' diets.

Similar research has monitored students' diets near and around their school environment, but many of these studies have observed younger adolescents (Akamatsu, 2011; Andrighetto et

al., 2015; Chortatos et al., 2018; Hannan et al., 2003), and other research focuses on college students (Burrows et al., 2017). This creates a gap in the understanding of the motivations and factors of high school students' snacking habits at school, especially in America, where childhood obesity is prevalent at high rates, and obesity among 12-19-year-olds marks the highest with 22.2% of Americans in this age group being obese (Stanford Medicine, 2022).

By filling this gap, this study attempts to document the dieting habits of students at a private independent school and establish a stronger connection between student demographics and their diet habits at school to add to this body of literature. The results of this study will have implications for the people supplying the school store with snacks and regulators of the school's diet choices, as they will have information on what needs to be addressed with students' diet choices at school.

Literature Review

This literature review will encompass some of the previous research conducted in the fields of high schoolers and their weight, food literacy, dieting habits, recommended diets, and measures taken to limit unhealthy snacking at school. Many of these subtopics have large bodies of research, so this literature review only includes the most relevant research and information to this specific study. All the research in this literature review comes from peer-reviewed academic journals or theses or notable, reliable sources, including Stanford Medicine and the USDA.

Weight

Obesity has been notoriously named a leading global epidemic (Stanford Medicine, 2022; Leach et al., 1991), and it has been found to have major impacts on students in school. To understand the academic effects of being overweight or obese in high schoolers, researchers Leach et al. (1991) compared the GPAs of 50 obese teenagers to 50 non-obese teenagers at one

school, finding a negative association between weight and GPA. This association was more negative for females than males, most likely due to the heightened social pressure girls feel, influencing their overall self-esteem and confidence needed to achieve high grades, but there was little difference between overweight and obese students' GPAs (Leach et al., 1991). This study was limited by a relatively small sample of the GPAs from one academic school year of 100 students, and other confounding variables, such as absenteeism, socioeconomics, retention levels, and ethnicity were not considered when analyzing the results. Nevertheless, these findings imply that measures should be taken in high schools to assist overweight and obese students to boost their academics.

Stanford Medicine has begun to take the necessary action of educating the public on teenage obesity by informing the public with basic information about the epidemic through educational programs including websites and seminars. They define teenage obesity and explain the causes, risk factors, symptoms, diagnosis, treatment, complications, and prevention of the disease (Stanford Medicine, 2022). More importantly, they highlight that lifestyle choices such as overeating and "a diet full of sugary, high-fat, and refined foods" can cause weight gain and obesity, and healthy snacks are a great way to prevent obesity. This information is intended for parents concerned about their children's obesity; however, it also has implications for anyone serving food to or concerned about at-risk teenagers, just as Leach et al. (1991) suggested monitoring teenage obesity more closely for academic reasons.

Food Literacy

One of the largest contributing factors to overall weight and health is food literacy (Brown et al., 2021), which has received lots of research attention as obesity rates rise (Azevedo Perry, 2017; Brown et al., 2021; Chortatos et al., 2018). Food literacy is important as it impacts

students making decisions about what snacks to pick at school; a higher food literacy indicates healthier snacking decisions at school. Azevedo Perry et al. (2017) performed a scoping review of 49 sources to uncover a certain definition of food literacy. They categorized their definition into five distinctive factors: (1) food and nutrition knowledge, (2) food skills, (3) self-efficacy and confidence, (4) ecologic, and (5) food decisions. Using this definition, Brown, Seabrook, Stranges, Clark, et al. (2021) examined food literacy in teenagers by sending a 29-question survey to children aged 13 to 19 in London, Ontario that determined their food and nutrition knowledge. From the 763 responses, they determined that adolescents have low food knowledge (59.2%) and nutrition knowledge (52.2%) (Brown et al., 2021). These studies in congruence imply that more action should be taken to boost the overall food literacy of teenagers. Having more food literacy can decrease the risk of being overweight (Brown et al., 2021), and thus teenage students can perform better in class with better food literacy, as Leach et al. (1991) suggest.

Teenager's Diet Choices

Many studies have monitored the consumption habits of adolescents and teenagers (Akamatsu, 2011; Andrighetto et al., 2015; Chortatos et al., 2018). Robert Akamatsu (2011) performed a cluster analysis of snack choice questionnaire results from students at eight junior high schools in Tokyo, Japan in 2005 to find common patterns among the responses. His results suggest that females had more concerns about their health than males when choosing snacks, correlating to healthier snacking portion sizes for females. Similarly, Igino Andrighetto and his fellow researchers (2015) surveyed 691 students aged 6-15 in Northeastern Italy from nine public schools that have healthy snack policies in place, finding evidence that supports that age and gender greatly impact food consumption habits at school. This finding was also supported

through a survey on Norwegian adolescents by Chortatos et al. (2018). The studies completed by Akamatsu (2011), Andrighetto et al. (2015), and Chortatos et al. (2018) each found statistically significant differences between the food choices of teenage males versus females, with females tending to make better decisions. This has important implications for programs intended to educate adolescents, as it might prove beneficial for them to target males.

In contrast, Bolton et al. (2015) conducted an umbrella review of 17 articles discussing dietary behavior among youth to find common determinants, finding that environmental factors are more important than social-cognitive determinants, such as demographics. On this note, 75% of the studies they reviewed reported that family influences are significant in teenagers' diets, and increased screen time caused less healthy diets across multiple studies (Bolton et al., 2015). Hannan et al. (2003) also examined factors in an observational study that could impact teenagers' diets at school, finding that having an à la carte option significantly increased students' chances of consuming unhealthy calories and significantly decreased the chances of consuming healthy amounts of fruits and vegetables. À la carte school stores provide students with immediate access to a wide array of snacks at school, which the school studied in this research uses. The findings of these studies suggest that food literacy habits largely come from environmental factors unrelated to demographics such as gender or age.

These studies are important to understand, as they provide the framework for the survey this paper aims to present.

Recommended Diets

As it has become apparent through recent research that measures must be made to mediate teenage students' obesity, more research and programs have focused on what foods are beneficial for limiting obesity and improving cognitive function for peak academic performance.

Fernando Gómez-Pinilla reviewed over 160 articles relating to foods and cognitive function. He found that diet, along with sleep and exercise, is the most important part of cognitive function, implying that altering diets to include foods such as Omega-3 fatty acids, moderate saturated fats, and B-Vitamins can increase brain functioning and possibly have therapeutic effects (Gómez-Pinilla, 2008). He also found that consuming too many calories can reverse these positive cognitive effects by slowing cognitive function. This could serve as an explanation for why Leach et al. (1991) found that being overweight or obese puts students at risk of having a lower GPA.

Other research has clarified the effects of diets on academics. Burrows and her team (2017) conducted a systematic review of seven studies on the effects of diet on academic achievement in college students, finding a positive correlation between fruit intake and GPA across multiple studies. Furthermore, they state that eating several meals a day of high-quality food also increases GPA (Burrows et al., 2017). This research on college students' diets coincides with that of Katie Adolphus, Louise Dye, and Clare Lawton (2013) who conducted a review of thirty-six sources studying the effects of eating breakfast on academic performance. They report that there is a positive correlation between eating breakfast and academic performance that is strongest amongst younger students (Adolphus et al., 2013).

While much literature suggests that there are beneficial foods for brain function, other research studies foods detrimental to brain function. Researchers Cardoso et al. completed a survey analysis of 3632 adults aged 60 and up to analyze the cognitive effects of eating ultra-processed foods. The major results found that the cognitive function called Animal Fluency, which impacts language and speech ability, is negatively associated with ultra-processed food consumption in the elderly without pre-existing conditions (Cardoso et al., 2022). Although this

analysis studied the elderly, the findings that ultra-processed foods can negatively impact brain function are significant because this further supports the idea that adolescents' cognitive function could be harmed by their diet, as Gomez-Pinilla (2008) also suggests.

Preventative Measures Taken

Globally, many programs have been enacted to increase food literacy to improve cognitive function and health among teenagers and adolescents. Andrighetto et al.'s review of Italian schools with such healthy snack policies in place found "that school-based policies to limit or deny access to unhealthy foods in the school environment are successful and may play an important role in promoting more healthful dietary patterns for school children," which suggests that, at least in Italy, such limiting programs are effective (Andrighetto et al., 2015).

Because of this, in the United States, the U.S. Department of Agriculture's (USDA) Food and Nutrition Services has set "Smart Snacking Standards" for American schools. In this report, the USDA outline that all schools are required to have smart snacks, the importance of smart snacking at school, the Smart Snack standards, and contacts for questions. Most importantly, USDA defines smart snacks as any food meeting these requirements: 200 calories or less, 200 mg of sodium or less, 35% of calories from total fat or less, less than 10% of calories from saturated fat, 0g of trans fat, 35% of weight or less from total sugars. The qualifications also include that the snack must be a: "grain product that contains 50% or more whole grains by weight… or have the first ingredient a fruit, …vegetable, … dairy …, or a protein food; or … combination food that contains at least ¼ cup of fruit and/or vegetable" (USDA, 2022). These standards set a protocol for schools to follow that serves to limit students' unhealthy diet behaviors. However, little to no research has been done to determine the effectiveness of these standards on students at schools.

Conclusion

This literature review covered sources related to teenage obesity, food literacy, diet choices, recommended diets, and preventative measures that have been taken to limit adolescent obesity. The sources convey that obesity negatively impacts GPA, therefore there should be more research put into students' diets. The definition of food literacy described in this literature review is important to know for helping students' diet choices at school. Certain demographic and environmental factors also have impacts on teenagers' diets. On that note, this review found certain foods are recommended for students for cognitive functions, and certain measures have been put in place in schools to enforce these rules with varying impact. These sources in congruence establish a need for more research into the dieting habits of students at school to make sure they are eating well for their academic performance. Thus, this survey research will determine the dieting habits of students at a private, independent school to add to this scholarly conversation.

Methods

For this study, a quantitative survey method was employed. This approach aimed to explore a relationship between certain demographics of high school students and their purchasing habits at an a-la-carte school snack store through three unique sections, including multiple-selection, Likert Scale, and open-ended questions as indicators of student habits and perception. This survey was completed by students in grades 9-12 at a private, independent school with a school store that charges students' purchases to their family accounts.

Survey Method

A survey is a form of a questionnaire that easily allows researchers to quantify, correlate, and/or predict data across large samples of a select population. A survey method is used to uncover "the depth and complexity of perception and reception," by collecting consistent data from a large sample (Gournelos et al., 2019). While an observational study could have been used for this research to document the habits of students at the school store, logistical issues with the researcher's schedule limit the sample size. Previous research on this topic using different age participants has used a survey. Thus, a survey method is best suited for this research.

This allowed for a larger sample of students who attend and do not attend the school store, revealing more specific determining factors of students dieting habits. The electronic distribution method allowed students who do not attend the school store to share their perceptions and habits that would be missed in an observational study, and it gave students who do purchase from the school store the ability to share what they purchase most often instead of just on a specific day. The responses to the survey were simple to analyze and sort for the data analysis as well. The survey allowed the researcher to collect data quickly and efficiently from a large sample.

Surveys do present certain limitations such as self-reporting (Gournelos et al., 2019). Participants, especially students sharing their habits, might feel pressure from societal norms and expectations to bend the truth in their responses, which could skew the conclusions. Thus, multiple questions covering similar concepts with different wording were included to make sure participants provided accurate answers about their habits. This increased the validity of the data conclusions.

Participants

The participants in this survey were male and female students in grades 9-12 at a private, independent high school with a school store. A Google Forms survey designed to take 5 to 10 minutes to complete was constructed and distributed via Schoology, a messaging portal that students at this school use daily for their academics and extracurriculars. Students were invited to take the survey on a Schoology post on the entire school's page from the school's Coordinator of Student Affairs and Communications, and they were given time during their advisory period to do so. Distributing the post this way eliminated sampling bias and allowed for more responses because students check their Schoology often. Since the survey was easily accessible, students were more inclined to respond. This Schoology post asked students to truthfully complete a quick anonymous survey. Students who chose to participate completed an informed consent section before sharing any of their information. They were informed that all their responses remained completely anonymous, and then they completed the demographics and school store habits sections of the survey.

The Survey Instrument

The survey had three primary sections. The first was an informed consent form, the second asked demographic questions about the participant, and the third asked respondents about their school store habits and dependence using a variety of multiple-selection, Likert scales, and open-ended questions. A full list of survey questions is in Appendix A, along with a full list of school store options.

Consent Section

The consent section of the survey informed participants that their responses remained anonymous, the survey had been approved by an Institutional Review Board, and their responses

were completely voluntary. It also asked that students spend 5 to 10 minutes to complete this survey honestly. Participants had to give their consent before moving on to the next sections by selecting the "I consent" option.

Demographic Questions

The two demographic questions were designed based on a literature review that focused on a population's habits. This section included two questions, asking participants about (1) their gender and (2) their grade level (9-12). This information about the participants provides insight into demographical trends and helps situate the surveyed population within the larger body of published literature. These background questions were brief yet crucial for understanding how age and gender contributed to school store habits. Questions established a background for each participant and allowed for a more comprehensive understanding of the results.

School Store Habits Section

The third and primary section of the survey comprises three data sources: multiple-selection, open-ended, and Likert Scale questions. The section was designed by analyzing common characteristics of surveys included in similar research throughout the literature review. The multiple-selection and Likert Scale questions allow for streamlined quantified responses that made the data analysis more efficient.

The most important part of the survey was the multiple selection questions that grouped snacks by their food group (candy, baked goods, chips, bars, refrigerated snacks, etc.) and asked respondents to share which snack type they purchase most often. The snacks were placed in their groups based on the USDA's definition of snack types according to their ingredients and nutritional value. The unhealthiest group was the "Candy" group, consisting of snacks high in sugar and low in nutritional value. The "Baked Goods" group included bagels, muffins, and

cookies. The “Chips” category was the broadest, and it included any type of corn or potato chip, pretzel, cracker, popcorn, etc. The “Bars” category included granola, nutritional, protein, or breakfast bars. Finally, the healthiest category was the “Refrigerated Snacks”, which included trail mix, yogurt, and hummus. A full list of snacks in each category can be found in the survey in Appendix A. This question allowed for a wide range of snacks to be analyzed methodologically.

The open-ended questions allowed for a deeper understanding of school store habits and perceptions for conclusions about each demographic’s habits. The final open-ended question of the survey asked respondents to optionally share any information they felt was relevant to gather any unasked information about their school store habits to provide insight into the overall sentiment of students regarding the school store. The culmination of the three data collection methods in this section (multiple-selection, Likert scales, and open-ended) functioned as a strong measure of perception as it coupled numerical data with reasoning.

Procedure

Because the research includes human participants, the school’s Institutional Review Board, including the school’s counselor, reviewed and approved the project before any action was taken.

After the survey was finalized on Google Forms, it was distributed to several members of the sample population as a test run to test for valid and accurate results before publishing it for the entire population to take. After hearing feedback from these participants, amendments were made to the survey. The test-run responses were not included in the data analysis, and the test-run respondents were asked to not take the survey when it was officially published.

Then, the high school's Coordinator of Student Affairs and Communications posted the survey link to the Schoology page asking for responses to be completed soon for a research project. The post remained up indefinitely, but after five days, the survey was closed so that no more responses could be recorded. The raw results were stored on Google Forms, then converted to an Excel file where they could efficiently be analyzed for trends using averages, proportions, and t-tests.

Results

This survey aimed to answer the question: To what extent do the demographics of students at a private independent high school impact their school store snacking habits? This section aims to outline the participant's demographics and to analyze trends by gender and age using averages, proportions, and t-tests.

Demographics

This survey yielded 295 responses total of 389 possible respondents, accounting for a 76% response rate for the five days it remained open. This is high due to the accessibility of the survey for the students on Schoology and from school administrators ushering students to participate in this research.

The responses suggest a representative sample of this particular American private-school's population, so the results of this survey could be scaled to the broader private, independent school community. Fifty-two point two (n=154) of respondents were female, 44.7% (n=132) were male, and 3.9% (n=9) chose not to share their gender. The age of respondents also aligns with American high school's typical makeup, although there was a slight lack of responses from juniors. Despite this lack of juniors which could serve as a limitation by skewing the results, a large sample allows for these results to be scaled to the general population. Twenty-

seven-point eight percent (n=82) of the respondents were freshmen, 27.8% (n=82) were sophomores, 17.6% (n=52) were juniors, and 26.8% (n=79) were seniors. Larger sample sizes, especially for seniors and freshmen allowed for more accurate data for these groups.

Gender Trends

The responses were first analyzed for trends by gender in table one. It is important to note that nine respondents chose not to disclose their gender, so their responses were not included in this analysis (n=289). As table one shows, males (n=132) averaged eating breakfast (3.85 times a week) more often than females (n=154) (2.92 times a week), which could contribute to why females had a higher reliance on (2.0) and the number of visits (1.53) to the school store than males (1.83, 1.27; respectively), as females would be hungrier for food after skipping breakfast. This disputes the findings by Azevedo-Perry et al. (2017) that adolescent females have higher food literacy because a higher food literacy would imply that they eat breakfast before attending school for maximum cognitive function.

However, Azevedo-Perry et al. (2017) and other researchers' claims that adolescent females have higher food literacy are supported by specific snacking results. The proportions of males versus females who admitted to purchasing different snack types regularly, which are shown as percentages in table 1, were compared using a t-test. Because the p-value (p= .000259) was less than the pre-determine alpha value (a=.05), this indicates that there is a significant difference in gender habits, and comparing the specific proportions finds that females purchase healthier snacks. Significantly higher proportions of males admitted to purchasing baked goods, bars, and candy, while females purchased more refrigerated snacks and chips than males. Baked goods and candy are not recommended by nutritionists for adolescents because of their lack of nutritional value, while refrigerated snacks such as yogurt are (Gomez-Pinilla, 2008 & Stanford

Medicine, 2022). Thus, these findings support those of previous research that adolescent females eat better foods than males.

Table 1
Male and Female Counts, Likert-Scale Averages, and Percentages who Purchase Snack Categories

	Females	Males
Count	154	132
% of total sample	52.2%	44.7%
Avg. # days eating breakfast	2.92	3.85
Avg. Reliance	2.00	1.83
Avg. Visits	1.53	1.27
Baked Goods	43.5%	47.7%
Refrigerated Snacks	17.5%	6.1%
Bars	14.9%	26.5%
Candy	30.5%	48.5%
Chips	66.9%	50.8%
NONE	9.1%	21.2%

Note. *p<.05. **p=.000259. The proportion of male versus female students consuming different snack types is statistically significant.

Grade Level Trends

Next, the results were analyzed for trends by grade level, as table two shows. The freshmen (3.52) and sophomores (3.56) averaged eating breakfast more often than the juniors (3.02) and seniors (3.15), which is surprising considering that the underclassmen (1.98, 1.95

respectively) visit the school store slightly more often than upperclassmen (1.83, 1.88 respectively). This could be concerning that underclassmen are eating more often, although the differences are not major. Table two highlights that there are no significant trends in the number of visits to the school store among the grade levels, which disputes previous findings that older students have higher food literacy (Chortatos et al., 2018). However, the previous research uses larger age groups instead of grade levels, which could account for their more significant findings.

The proportions of each grade level who purchased different snack types regularly, which are shown as percentages in table 2, were compared using a Chi-squared test with p=.05, which found no statistically significant difference in purchasing habits by grade (p=.647). It's important to note, however, a few noticeable trends in the snacking data that can be determined from table two. First, greater proportions of underclassmen consumed candy, while greater proportions of upperclassmen consumed bars. This indicates that underclassmen make less wise health decisions than upperclassmen, lowering the food literacy of underclassmen. There also is a significantly larger proportion of seniors who do not attend the school store regularly, however, the reasons for this remain unknown. These findings have implications for the broader society of American high schools.

Table 2

Grade Level Counts, Likert Scale Averages, and Percentages who Purchase Snack Categories

	9th	10th	11th	12th	TOTAL
Count	82	82	52	79	295
% of total sample	27.8%	27.8%	17.6%	26.8%	
Breakfast	3.52	3.56	3.02	3.15	3.35
Reliance	1.98	1.95	1.83	1.88	1.92
Visits	1.40	1.40	1.30	1.44	1.40
Baked Goods	46.1%	44.9%	50.3%	46.6%	45.8%
Refrigerated Snacks	14.2%	10.7%	11.1%	17.2%	12.2%
Bars	16.6%	13.0%	20.8%	27.0%	19.7%
Candy	39.0%	46.1%	35.4%	28.2%	38.7%
Chips	59.1%	55.6%	54.1%	61.4%	59.7%
NONE	9.5%	14.1%	9.3%	22.1%	14.6%

Note. *p<.05. **p=.647. The proportion of students in each grade consuming different snack types is not statistically significant.

Discussion

Current literature finds that students' diets can be affected by their age and gender, however little to no preexisting research looked specifically at these demographical trends in high school students. Such research has prompted programs to educate children and adolescents on their food decisions. The findings of this research indicate that such programs could be useful. It is important to understand that despite gender impacting dietary patterns, grade level does not have as large of an impact.

Identifying common snacking patterns by gender and age functions as a marker for educational programs to target their information on certain demographics. Future educational

programs specifically targeting boys could prove useful in limiting unhealthy snacking at school. However, it might not be as useful to target educational dieting programs by grade level, but future research could indicate whether this is true.

The results from this survey overall are congruent with existing literature; the survey affirmed that gender has an impact on snacking habits (Akamatsu, 2011; Andrighetto et al., 2015; Chortatos et al., 2018), although grade level has never been studied in this aspect. The gap in high schoolers snacking habits is addressed in this research, following the trends of these past studies. The findings of this research open new doors for future research that could determine if larger age groups (i.e. High-schoolers versus middle schoolers) show stronger dieting trends as opposed to just grade levels, since those results were inconclusive.

Conclusion

This study explored the common snacking habits of high schoolers at an a-la-carte school store through a survey on their school's portal. The population identified gender as a significant factor in snacking habits, while grade level proved less important for habit development. These results are consistent with existent literature; the survey affirms that gender has impacts on adolescents' snacking habits. The grade level trend has seldom been discussed in existing literature, thus this research provides a baseline for further literature to explore more trends among age groups and their snacking habits.

This research is important as it establishes a baseline understanding of gender and grade level impacts on snacking habits, which could be useful for educational programs to target specific demographics with lower food literacy. Previous research has not yet established demographical trends of high schoolers' snacking habits. This survey established a potential

connection between gender and grade level of high schoolers and their snacking habits at the school store.

Limitations

Although the study found results that answered the proposed research question, limitations impacted the study. Distributing the survey to students to disclose their habits gave first-hand information, however, it also allowed for response bias. To limit this, I asked similar questions in different ways to see if responses changed for each respondent, and then I streamlined their responses to analyze the data.

Next, the open-ended questions were meant to give a deeper understanding of students' perceptions of the school store, but their responses did not fulfill this role; Many were incomplete, single words or phrases, or unrelated to the purpose of this study. For this reason, these open-ended questions were not included in the analysis. In future research, such questions could have more transparent wording to obtain desired responses for a better understanding of students' school store perceptions.

Certain characteristics of the school studied could have been confounding factors in this survey. The school studied serves both breakfast and lunch on an a-la-carte basis in the cafeteria, which is separate from the school store. Students could have completely different dieting habits between the school store and the cafeteria that would lead to finding different trends if this research had included questions about the dieting habits in the cafeteria as well as the school store. Also, the school studied is a private school with an annual tuition that nearly 80% of student's families pay. As Bolton et al. (2015) found, teenagers from families with higher socioeconomic statuses, such as those willing to pay private school tuition, tend to have higher food literacy, and therefore eat healthier foods than the general population. On top of that, not all

schools have a la carte school stores, which could lead to different snacking habits. These factors serve as limitations from generalizing the results of this research to all high schools in America.

Furthermore, it is important to note that the students at this high school are exposed to nutritional education in their required health classes. This could overall raise the food literacy of these students, as it was not accounted for in the research. It is important to understand the implications of taking this class on food literacy when analyzing this data.

Finally, there were a disproportional number of juniors who took my survey. This could potentially skew results away from finding an age level trend, which could contribute to the lack of a statistically significant trend for grade level dieting habits. Future research wanting to investigate grade level trends could weigh responses, or make sure there is a proportional number of students from each grade who take the survey.

Implications & Future Research

This research suggests that gender plays a significant role in the habits of students at the school store, while grade level does not play as significant a role. Despite this, these findings suggest that grouping students into larger age groups could indicate more significant trends in snacking habits. Society can move on this information by understanding that certain demographics of adolescents are at risk for making poor dieting decisions at and around their school, and working to help at-risk demographics.

This research also found significant patterns between demographics and the proportions of students who abstain from the school store. Future research could investigate if those high-school students who abstain from the school store are eating snacks from different sources, and how those snacks might vary in nutritional value from those served at the school store. This

information is important to understand for those supplying the school stores with snacks, as they might earn insight into how to gain more customers.

Regarding demographics as an important diet-determining factor, schools and parents should be wary of what foods they serve their students. This could imply that government instills more educational programs targeted at certain at-risk demographics, such as younger males, to help improve food literacy. Future research, like that done by Andrighetto et al. (2015), could investigate the efficacy of such programs before instilling them on a national level. Nevertheless, society benefits from understanding these results as it is important for understanding diet trends among adolescents, which have the power to affect the long-term health of citizens.

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Appendix A

Survey Instrument

Part 1: Consent-

You are being asked to participate in a research study that aims to determine the common school store snacking habits at a private, independent high school. An institutional review board has approved of this research. This 10-to-15-minute survey is voluntary for you to complete, and your responses will remain anonymous. By clicking the next button, you agree to share your responses with the researcher for their data collection. Thank you for your time.

1. Do you consent to your anonymous responses being used for an AP research project?
    - I consent.

Part 2: Demographic Questions-

1. To which gender do you most identify?
    - Female
    - Male
    - Prefer not to say.
    - Other
2. What grade are you in?
    - 9^{th}
    - 10^{th}
    - 11^{th}
    - 12^{th}

Part 3: School Store and Dieting Habits

1. During the average school week (Monday-Friday), how many days do you eat breakfast before school?
    - 1
    - 2
    - 3
    - 4
    - 5
2. During the average school day, how many times do you purchase food and/or beverages from the school store?
    - 0
    - 1
    - 2
    - 3
    - 4+
3. How much would you say you rely on the school store for food daily?
    - 0- It has no impact on my diet
    - 1
    - 2
    - 3
    - 4
    - 5- I need it or I would not eat anything at school
4. If you purchase snacks, which ones do you purchase most often?
    - Chips (Popcorn, Sun Chips, Cheez-its, Pretzels, Veggie straws)
    - Bars (Granola bars, protein bars, etc.)
    - Candy (Fruit Snacks, chocolate, popsicles, etc.)

- Baked goods (bagel, muffin, brownie, etc.)
- Refrigerated Goods (hummus, Sargento snacks, balanced breaks)
- I do not purchase food from the school store.
- Other- please specify.

5. If you purchase chips at the school store, which ones do you purchase most often?
   - Cheez-it
   - Skinny Pop
   - Chex Mix
   - Veggie Straws
   - Sun chips
   - Potato Chips
   - Pretzels
   - Goldfish
   - Takis/ Cheetos/ Doritos
   - I do not purchase chips from the school store.
   - Other- please specify.
6. If you purchase bars at the school store, which ones do you purchase most often?
   - Granola Bars
   - Nutri-grain Bars
   - Protein Bars
   - Luna
   - Quest Bar
   - I do not purchase bars from the school store.
   - Other
7. If you purchase candy at the school store, which ones do you purchase most often?
   - M&M
   - Airheads
   - Starburst
   - Skittles
   - Kit-Kat
   - Twix
   - York
   - Hershey's Chocolate
   - Fruit Snacks
   - Popsicles
   - I do not purchase candy from the school store.
   - Other
8. If you purchase baked goods at the school store, which ones do you purchase most often?
   - Bagels
   - Muffins
   - Brownies
   - Little Bites
   - Vanilla Wafers
   - Honey Buns
   - Cookies (Oreos or Lorna Doone)
   - I do not purchase baked goods from the school store.
   - Other
9. If you purchase refrigerated snacks at the school store, which ones do you purchase most often?
   - Hummus
   - Sargento Snacks
   - Yogurt

- Balanced Breaks Packs
- I do not purchase refrigerated snacks at the school store.
- Other

10. If you regularly purchase beverages from the school store, which ones do you purchase most often?
    - Gatorade
    - Sweet Tea
    - Juice
    - Vitamin Water
    - Water
    - Milk/ Chocolate Milk
    - Frappeccino
    - I do not purchase beverages from the school store.
    - Other- please specify.
11. If you choose to not purchase snacks and beverages from the school store, why?
    - It is too expensive.
    - I bring my own food.
    - I want healthier options.
    - I don't like their options.
    - The line is too long.
    - I'm not allowed to go to the school store.
    - I have technical difficulties with my account.
    - I'm not hungry.
    - Other- please specify.
12. Is there any other information that you would like to share regarding your habits at the school store? (Open Ended)

School Store Options

- Cheez-it
- Skinny Pop
- Chex Mix
- Veggie Straws
- Sun Chips
- Lays Potato Chips
- Pretzels
- Goldfish
- Takis
- Cheetos
- Doritos
- Granola Bar
- Nutri-grain Bar
- Protein Bar
- Luna Bar
- Quest Bar
- M&M
- Airheads
- Starburst
- Skittles
- Kit-Kat
- Twix
- York
- Hershey's Chocolate
- Fruit Snacks
- Popsicles
- Bagels
- Muffins
- Brownies
- Little Bites
- Vanilla Wafers
- Honey Buns
- Oreos
- Lorna Doone Cookies
- Hummus
- Sargento Snacks
- Yogurt
- Balanced Breaks Packs
- Gatorade
- Sweet Tea
- Juice
- Vitamin Water
- Water
- Milk
- Chocolate Milk
- Frappeccino