

**PBH**<sup>®</sup>  
FOUNDATION

# HACKS TO HABITS

**A BEHAVIORAL RESEARCH STUDY TO BOLSTER  
FRUIT & VEGETABLE CONSUMPTION**

**INSIGHTS REPORT**





# ABOUT THE PRODUCE FOR BETTER HEALTH FOUNDATION

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The Produce for Better Health Foundation (PBH), a nonprofit 501(c)(3), is the only national organization dedicated to helping consumers live happier, healthy lives by eating more fruits and vegetables, including fresh, frozen, canned, dried and 100% juice, every single day.

Since 1991, PBH has invested in developing trended insights on attitudes toward all forms of fruit and vegetable consumption, in addition to campaigns and partnerships with government, food industry stakeholders, health professionals and other thought leaders to collaborate, facilitate and advocate for increased intake. Campaigns included first, the 5-A-Day program, and then, the Fruits & Veggies—More Matters public health initiative. While five fruits and vegetables each day is great advice, and more will always matter, PBH's new behavior-based call-to-action is Have A Plant®. Rooted in behavioral science, PBH's transformative Have A Plant® Movement is an invitation that will inspire people with compelling reasons to believe in the powerful role fruits and vegetables can play to create happy, healthy and active lives.

Be sure to join the Have A Plant® Movement and get new recipes, snack hacks, meal ideas and other tips from chefs, registered dietitians, as well as food and wellness experts by visiting [www.fruitsandveggies.org](http://www.fruitsandveggies.org). Follow us on Facebook @fruitsandveggies; on Twitter @fruits\_veggies; on Instagram @fruitsandveggies; on Pinterest @fruits\_veggies; and on LinkedIn at Produce for Better Health Foundation. And remember to #haveaplant.

PBH is also responsible for the Lead The Change Collaborative Consumption Campaign – a multi-sector, multi-year initiative designed to maximize the power of PBH's unique thought leadership position, widespread influencer network, credible scientific and market research, and, most importantly, its innovative members and partners, to lead a call-to-action for addressing the global fruit and vegetable consumption crisis. The initiative includes research, thought leadership and communication platforms to ensure stakeholders speak with One Purpose, One Voice and One Call-to-Action for maximum impact. For more information about the Lead The Change Campaign visit [fruitsandveggies.org/lead-the-change](http://fruitsandveggies.org/lead-the-change).

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# INTRODUCTION

The Produce for Better Health Foundation (PBH) is the only nonprofit 501(c)(3) dedicated to helping consumers live happier, healthy lives by eating more fruits and vegetables, including fresh, frozen, canned, dried and 100% juice, every single day. One of PBH's most significant contributions to public health and nutrition, as well as the broad-based fruit and vegetable industry, is conducting innovative consumer research and delivering unique insights to reverse the pervasive and persistent crisis of fruit and vegetable underconsumption.

Fruits and vegetables are foundational to a healthy dietary pattern. Authoritative bodies have long recommended consumption of fruits and vegetables based on their low energy density, high nutrient density and dietary fiber content. In addition to supporting basic human nutrition needs, fruits and vegetables offer a plethora of health-promoting benefits, such as reducing inflammation and enhancing gut microbiota, and are associated with reducing the risk of multiple chronic diseases that contribute to premature mortality and years lived with disability and/or morbidity.<sup>1</sup>

Nine in 10 Americans do not consume recommended amounts of fruits and vegetables.<sup>2</sup> The 2020 Dietary Guidelines Advisory Committee noted that fruit and vegetable consumption volume has not changed significantly between the 2003-2004 and 2015-2016 National Health and Nutrition Examination Survey (NHANES) collection periods.<sup>3</sup> Currently, the average adult consumes less than a cup (0.9)<sup>3</sup> of the recommended 1.5-2.5 cups of fruit per day<sup>4</sup> and just 1.6 cups<sup>3</sup> of the recommended 2-4 cups of vegetables daily.<sup>5</sup> Further, research demonstrates that both volume and frequency of fruit and vegetable consumption are an ongoing concern.

Alarming, frequency of eating occasions containing fruits and vegetables has continued to decline over time. *PBH State Of The Plate* data shows a 10% reduction in eating occasions between 2004 and 2020. While 95% of consumers eat vegetables during a given week, the average consumption is 7.5 weekly eating occasions, or approximately once per day. More than one-fourth (26%)

**This research was designed to be laser-focused on the attitudes and behaviors of those consuming varying levels of fruits and vegetables, to better understand strategies, such as simple hacks, that could effectively make it easier for Americans to adopt and sustain fruit and vegetable consumption habits.**

of consumers do not eat fruit at any point during the week, and the average eating occasions are less than vegetables – just 5.8 times weekly (Figure 1).<sup>6</sup>

*PBH State Of The Plate* research also illuminates specific behavioral trends jeopardizing fruit and vegetable consumption over time, such as a reduction of vegetable side dishes with dinner and drinking less 100% fruit juice. Further, those who have traditionally consumed the most fruits and vegetables are, in many cases, now eating them less frequently. Older generations, who serve as behavioral role models for younger generations, are among the groups now consuming fruits and vegetables less often.<sup>6</sup>

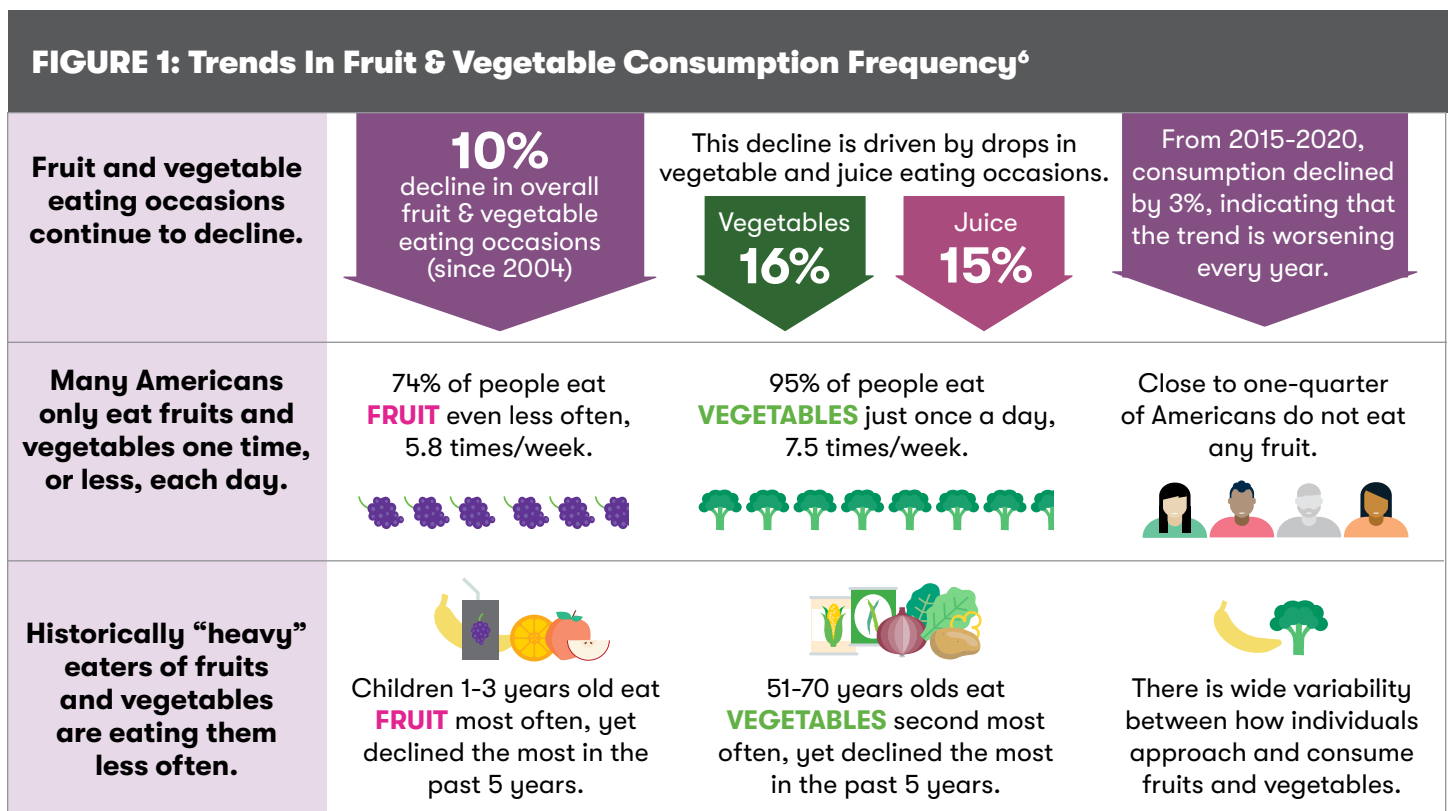


Humans are creatures of habit. A decline in eating occasions that include fruits and vegetables among traditionally higher-frequency consumers, as well as a reduction in previously prevalent uses of fruits and vegetables in everyday life, is of great concern – particularly when underconsumption is already so widespread. There is an urgent need to act decisively and relentlessly to support consumers in making it easy to access, purchase, prepare and consume fruits and vegetables, and repeatedly do so, to bolster existing fruit and vegetable habits and build new ones.

This is the impetus behind PBH’s innovative and trailblazing approach of overlaying behavioral science with consumption data, policy analysis, as well as food and nutrition research to help inspire the next generation of fruit and vegetable lovers as well as build new fruit and vegetable habits. This research was designed to be laser-focused on the attitudes and behaviors of those consuming varying levels of fruits and vegetables, to better understand which strategies, such as simple hacks, could effectively make it easier for Americans to adopt and sustain fruit and vegetable consumption habits.

**Identifying successful ways to inspire simple and sustainable habits at all points of consumers’ food journey will be essential to successfully reversing chronic and prevalent fruit and vegetable underconsumption.**

In addition, this research, created in consultation with behavioral science experts, builds on consumer behavior techniques recommended in previous versions of the *Dietary Guidelines for Americans* (DGA), such as “steps to a healthier you” and “start simple with MyPlate” messaging. As evidenced by this research, consumer behaviors and habits are complex – and identifying ways to inspire simple and sustainable habits at all points of consumers’ food journey will be essential to successfully reversing the fruit and vegetables consumption decline.



# METHODOLOGY

A sample of 1,024 fruit and/or vegetable consumers in the United States (US) completed a 15-minute, online survey between July 8 and July 19, 2021. Data was weighted to the US Census on gender, age, income, region, household size and race/ethnicity.

Consumers were classified as low-, medium-, and high-frequency fruit and/or vegetable eaters using methodological categories from the 2020 PBH State Of The Plate study. In that study, fruit and vegetable consumption frequency levels were determined by natural cutoffs in those data. Low-frequency fruit eaters were defined as having 1-6 weekly eating occasions of fruit; medium-frequency eaters have 7-11 weekly eating occasions; and high-frequency eaters have 12 or more weekly eating occasions containing fruit. For vegetables, low-frequency eaters were defined as 1-7 weekly eating occasions; medium-frequency have 8-11 eating occasions weekly; and high-frequency eating occasions were 12 or more weekly eating occasions containing vegetables (Table 1).

In addition to consumption frequency, respondents in this study were grouped according to whether they had fruit and/or vegetable shopping and/or consumption habits. Respondents were asked a series of questions to determine if they had a shopping or consumption habit; these questions were adapted from a “habit index” – a tool developed previously by consumer behavior academic researchers specializing in habit formation.<sup>7,8,9</sup> Specifically, the questions were designed to measure automaticity in shopping and consuming behaviors. The respondents’ “habit score” was based on whether the behavior was something (1) they did automatically, (2) without consciously remembering, (3) without thinking and (4) before realizing they are doing it. Each of the four ratings was asked on a 7-point scale (1 = agree, 7 = disagree). When the mean score for all four questions was 2.0 or less, the respondent was deemed to have a habit (See Sidebar).

**TABLE 1: Definition Of Fruit & Vegetable Intake Frequency**

	High-Frequency	Medium-Frequency	Low-Frequency
FRUITS	12+ times per week	7-11 times per week	1-6 times per week
VEGETABLES	12+ times per week	8-11 times per week	1-7 times per week

## HABIT SCORE METHODOLOGY

### HABIT VARIABLES

*Is the shopping/consumption behavior something the respondents did:*

1. Automatically
2. Without consciously remembering
3. Without thinking
4. Before realizing they were doing it

### SCORE

7-point scale (1 = agree, 7 = disagree)

### MEAN SCORE ≤ 2.0 = HABIT

*Habit score based on Self-Report Index; Gardner et al., 2012; Gardner & de Bruijn, 2011; Ji & Wood, 2007*

# FINDINGS

## Using Behavioral Science To Positively Impact Fruit & Vegetable Consumption

In 2017, PBH began engaging behavioral science experts to develop a framework that best supports Americans in not only eating, but also enjoying, more fruits and vegetables. The framework is predicated in three drivers of behavior: 1) what we **KNOW**; 2) what we **FEEL**; and 3) what we **DO**. In the **KNOW- FEEL-DO Behavioral Framework**, *knowledge* is facts and skills, *feeling* is emotions and desires, and *doing* is routines, plans, impulses, trial, conversations, etc. (Figure 2)

Experts agree that *knowing* the importance of eating fruits and vegetables is not enough. Rather, effective consumer education and engagement must lean into how people *feel* about eating fruits and vegetables, and environments must make *doing*, or eating fruits and vegetables more often, easier, enjoyable, automatic and, ultimately, habitual. This includes all stages of consumers' fruit and vegetable consumption journey — from finding and buying, to storing and prepping and, ultimately, to eating and enjoying. To quote 2017 Nobel Prize winning behavioral economist, Richard Thaler, PhD, "If you want people to do something, you have to make it easy."<sup>10</sup>

**Effective consumer education and engagement must lean into how people feel about eating fruits and vegetables, and environments must make doing, or eating fruits and vegetables more often, easier, enjoyable, automatic and, ultimately, habitual.**

**FIGURE 2: The PBH KNOW-FEEL-DO Behavioral Framework**





## KNOWING: An Important Step In The Consumption Journey

Consumers are largely aware that fruits and vegetables are healthy, correctly associating them with a wide variety of physical benefits ranging from boosting immunity to improving gut health and more. In this study, specifically, individuals with consumption habits are significantly more likely to associate health benefits with eating fruits and vegetables (immunity, gut health, weight management, energy, the environment, emotional well-being, and managing a health condition) compared to those without habits (Figure 3).

**Future health is not necessarily a top fruit and/or vegetable consumption motivator. More focus should be placed on short-term rewards, such as taste and enjoyment.**



However, knowledge of fruit and vegetable healthfulness does not automatically beget action. Further, knowledge does not only apply to *understanding* their health benefits, but also having sufficient skills to *achieve* greater consumption. Across all vegetable eaters, the greatest motivation for vegetable selection is that “it’s a favorite.”<sup>6</sup> Still, in this study, low-frequency vegetable eaters are significantly more likely than high- or medium-frequency eaters to say that if they could make anything easier about eating vegetables, it would be the ability to make them taste better. Vegetable eaters express that taste is a challenge, particularly with finding a variety and preparation style or recipe everyone likes.

These findings echo previous insights from behavior research, with decades of science finding that future health does not appear to be a motivator for short-term behavior change, including food consumption. Individuals tend to be “present-biased” in their behavior, choosing short- over long-term rewards. They often deal with problems when they arise, rather than anticipating them and addressing them “upstream.” While a great deal of work has been completed to identify mechanisms to make it easier for people to make choices that benefit them long-term,<sup>11,12,13</sup> research suggests approaches that focus messaging and initiatives on short-term rewards, such as taste and enjoyment, may be most effective in positively impacting fruit and vegetable consumption.

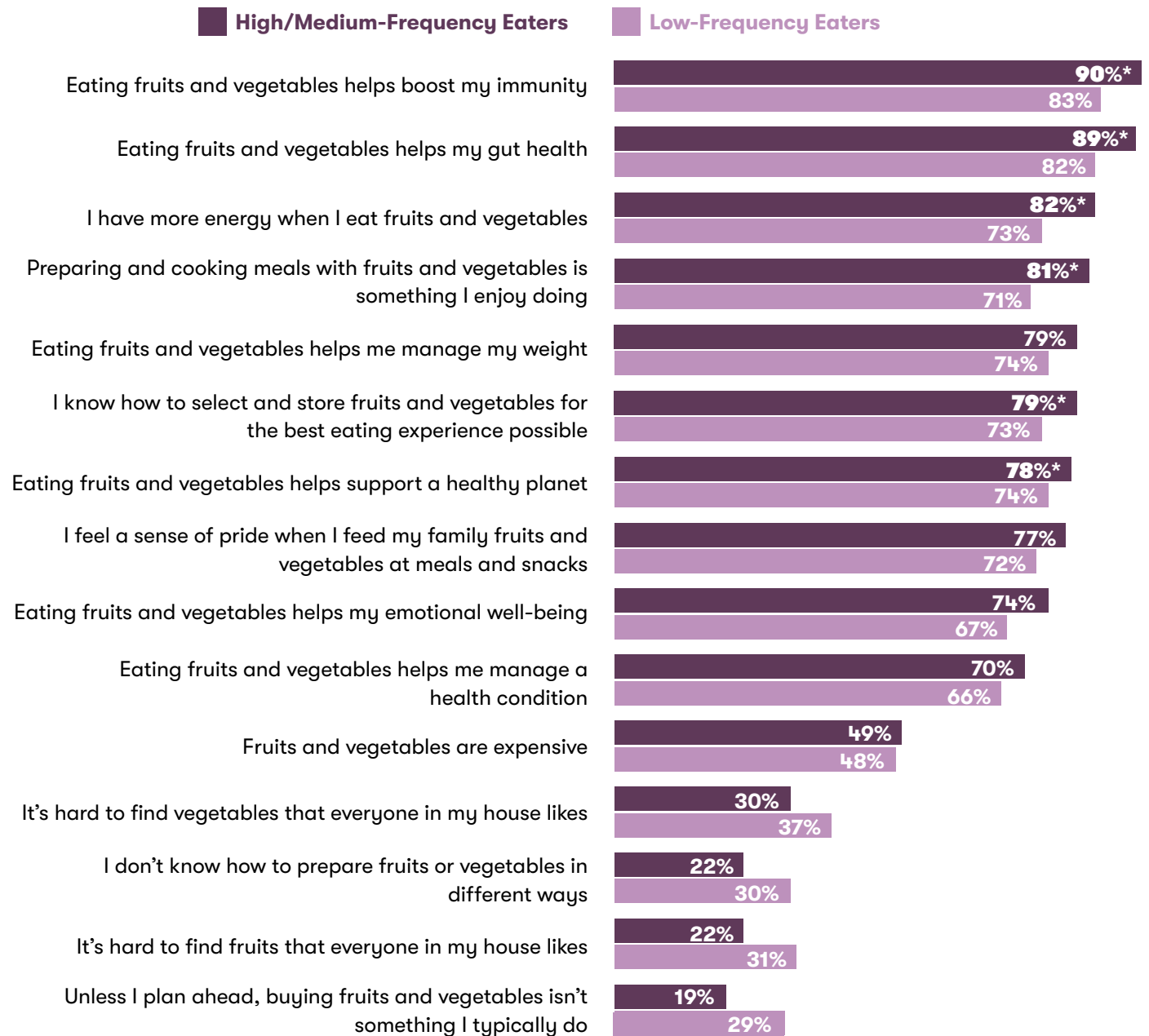


**FIGURE 3: Perceptions Of Health Benefits Of Fruits & Vegetables Among High-/Medium- & Low-Frequency Eaters**

**QUESTION: Please tell us how much you agree or disagree with each of the following statements.**

High-/Medium-Frequency Fruit & Vegetable Eaters (n=402); Low-Frequency Fruit & Vegetable Eaters (n=868)

**Thoughts On Fruits & Vegetables Related To Health, % Of Respondents**



**Bold** number indicates statistically significant at a 95% confidence level; \*Significant to Low-Frequency Fruit & Vegetable Eaters

## FEELING: Mindset Matters

Taste is a key component of food selection and enjoyment. For the 12<sup>th</sup> consecutive year, the International Food Information Council (IFIC) Food & Health Survey showed that taste was the number one consideration when choosing which foods and beverages to purchase, with 80% of respondents saying it impacts their choice.<sup>14</sup> As previously discussed, taste is seen as an obstacle to vegetable consumption, in particular. When enjoyment is present, it can be the basis for repeat behavior and habit creation.

A growing body of research shows that individuals who eat fruits and vegetables most frequently express higher levels of life satisfaction and happiness compared to those who eat none or very little.<sup>15,16,17</sup> In addition, eating fruits and vegetables is associated with positive feelings, such as pride and joy.<sup>17</sup> Insights from this study indicate

**Taste and enjoyment can be the basis for repeat behavior and habit creation.**

that habitual fruit and vegetable consumers express significantly more enjoyment and pride from preparing and serving produce than those without the habit. For example, 90% and 93% of those with fruit and vegetable habits, respectively, say that preparing and cooking meals with fruits and vegetables is something they enjoy doing – significantly more than fruit (66%) and vegetable eaters (65%) that do not have a habit. Further, 88% and 92% of habitual fruit and vegetable eaters say that they feel a sense of pride when they feed their family fruits and vegetables at meals and snacks, which is significantly greater than fruit (65%) and vegetable eaters (64%) without a consuming habit.

## DOING: The Pinnacle Of Behavior Change

There is extreme complexity among knowledge, emotion and action within the consumer fruit and vegetable consumption journey. While *doing* is the differentiating factor between those who seek out, shop for and consume fruits and/or vegetables more or less frequently, action cannot be fully separated from knowledge and feelings. For example, PBH's research, *Novel Approaches To Measuring And Promoting Fruit and Vegetable Consumption*, showed that with increased days of fruit and vegetable consumption (frequency), the amount of fruits and vegetables (volume) consumed also increased.<sup>17</sup>

The same study's findings demonstrated that those who consumed fruits and vegetables more frequently often reported experiencing similar barriers, such as finding options that appeal to the whole family, lack of preparation skills and physical limitations, as those who consume them less frequently, but managed to overcome them.<sup>17</sup> This current study may further illuminate "the why" behind previous findings; for example, habitual fruit and vegetable consumers express a high level of confidence that they know how to select and store produce for the best eating experience possible (92% and 93%, respectively), potentially helping them close the knowledge-action gap.



Commensurate with the PBH State Of The Plate research, the majority of Americans are low-frequency consumers of fruits and vegetables and the lowest percentages are attributed to high-frequency consumers.<sup>6</sup> In this study, 65% of consumers are low-frequency fruit eaters with 6 or fewer weekly eating occasions. Only 27% of consumers are medium frequency eaters (7-11 weekly eating occasions) and the remainder (8%) have 12 or more weekly eating occasions (Figure 4). Figure 5 demonstrates that low frequency vegetable consumption is even more prevalent with 80% of consumers having just one to seven weekly eating occasions of vegetables. Nine percent of consumers are medium-frequency vegetable eaters (8-11 weekly eating occasions). A small percentage (11%) of consumers have 12 or more weekly eating occasions.

**Consumer intervention can occur at any point in the KNOW, FEEL, DO continuum within the consumption journey. We must KNOW our consumer and the power of habit; help them FEEL, or recognize, the reward; and inspire them to repeatedly DO the behaviors in easy and enjoyable ways to create automatic fruit and vegetable consumption habits.**

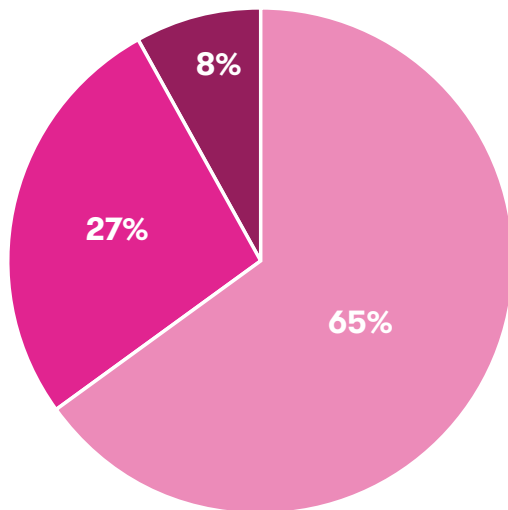
**FIGURE 4: Fruit Consumption Frequency**

**QUESTION: How often do you consume fruits in a typical week?**

Fruit Eaters (n=995)

- **High-frequency:** 12+ weekly eating occasions
- **Medium-frequency:** 7-11 weekly eating occasions
- **Low-frequency:** 1-6 weekly eating occasions

**Consumption Frequency, % Of Respondents**



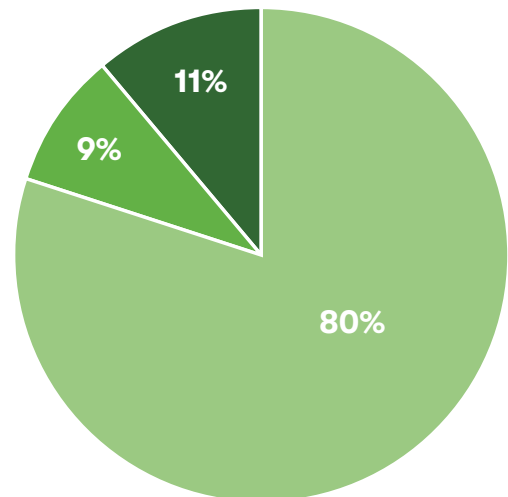
**FIGURE 5: Vegetable Consumption Frequency**

**QUESTION: How often do you consume vegetables in a typical week?**

Vegetable Eaters (n=1013)

- **High-frequency:** 12+ weekly eating occasions
- **Medium-frequency:** 8-11 weekly eating occasions
- **Low-frequency:** 1-7 weekly eating occasions

**Consumption Frequency, % Of Respondents**



# Understanding Fruit & Vegetable Consumption Behaviors & Habits

Four additional findings grew out of the exploration of the inner workings of fruit and vegetable consumption behaviors, including insights into the habits, mindsets and behaviors of those who consume the highest levels of fruits and vegetables and those who consume little to none. These include:

1. Habit-creating opportunities for fruits and vegetables are very different;
2. Fruit and vegetable habits are context-specific automatic behaviors;
3. High-frequency and medium-frequency eaters have more fruit and vegetable habits; and
4. Low-frequency fruit and vegetable consumers can build habits from hacks.

**Easy and rewarding behaviors have the best chance of being frequently repeated and, in turn, of becoming habits.**

**FIGURE 6:  
Ingredients Of A Habit**

**HABIT = EASE +  
REWARD +  
REPETITION**

## HABIT SCIENCE 101

According to behavioral science experts, habits are automatic behaviors that have been internalized.<sup>18,19,20</sup> They are how an action is performed, not the action itself. In fact, it has been estimated that about 43% of what people do every day is repeated in the same context, usually while they are thinking about something else.<sup>18</sup>

How then does an action become automatic? How does it become a habit? The short answer is: The behavior must be repeated – over and over, potentially hundreds of times or more.<sup>18,20</sup>

The next question is, how do behaviors get repeated? Two good predictors of repetition are ease and reward. Individuals are much more likely to repeat actions that are easy, as well as those from which they derive pleasure.<sup>18,20</sup>

One way to think of the relationship between these concepts is:

**HABIT = EASE + REWARD + REPETITION** (Figure 6)

Starting with actions that are already easy and even have the potential to become easier over time (as is often the case with actions that can be done at the same time and place each day) is optimal for forming habits. Further, habit-forming behaviors should be rewarding (e.g., eating a favorite fruit or vegetable and/or flavorful preparation). Easy and rewarding behaviors have the best chance of being frequently repeated and, in turn, becoming habits.

Of note, there exists a belief that those who eat healthfully have greater willpower. This is a misconception. Research has proven over time that habits outperform willpower — and can drive behavior even when self-control is low.<sup>21,22</sup>



## KEY FINDING: Habit-Creating Opportunities For Fruits & Vegetables Are Very Different

In public health nutrition recommendations, fruits and vegetables are often promoted together; however, previous PBH research has shown, and this study further illuminates, that consumers do not equate these two food groups. Rather, consumers experience differing motivations and challenges to consuming each. Understanding what behaviors require additional ease, as well as how to underscore reward and enjoyment, can further bolster habit formation and support increased consumption.

While both fruits and vegetables are perceived as healthy<sup>6</sup>, the context, cues and mindset around eating fruits and vegetables are very different. To many, fruit means sweet and happiness, while vegetables convey savory and smart, for example. When asked in this research the first word that comes to mind regarding fruits, the most common responses were sweet, juicy, refreshing, and vitamin. Alternatively, vegetables invoked respondents to reply green, crunchy, fiber and nutritious.

Vegetables have a significant taste hurdle – while fruit shines based on its portability. Consumers find fruit (77%) to be among the easiest food groups to eat when in a rush, while vegetables (59%) and whole grains (52%) are least easy. Whole grains (16%) and vegetables (9%) are perceived as the most difficult food groups to “make taste really good.” Specifically, low-frequency vegetable eaters struggle with making vegetables “taste really good” – a potential opportunity to share easy and flavorful recipes, preparation hacks and flavor combinations, including usage of herbs and spices.

Vegetables are the most difficult food group to feed children; fruit is much easier. Eighty-two percent of respondents say that it’s easy to get kids to eat fruit; only 68% say the same for vegetables. Respondents say that dairy is the easiest food group to feed children (85%), followed by protein (83%), desserts (82%), and whole grains (69%). Close to two-thirds of those with an annual income less than \$25k say they have an easy time getting their kids to eat fruit, as compared to 93% of those with annual incomes of \$50-\$75k.

**Consumers will likely need to create different habits around fruits versus vegetables – adding complexity to the consumption journey.**

Consumers build eating patterns based on foods, food groups, mixed dishes and meals. Therefore, it is important to not only understand similarities and differences between fruits and vegetables, but also how consumers think about them compared to other food groups. Fruits and vegetables pose a challenge when it comes to spoilage yet fare somewhat better on preparation ease. Consumers say that vegetables (14%), followed by fruits (12%), are most difficult to eat before they go bad compared to whole grains (11%), dairy (11%), and protein foods (5%). Fruit eaters, particularly those with higher consumption frequency, struggle with spoilage – a potential opportunity to help overcome this barrier and encourage greater repetition. Fruits (84%) and vegetables (81%) are perceived to be easier to have ready (e.g., open, wash, cut, cook, plate, etc.) compared to protein (80%) and whole grains (71%).



## **KEY FINDING: Fruit & Vegetable Habits Are Context-Specific Automatic Behaviors**

As outlined in the methodology, this study measured the extent to which respondents had a fruit and/or vegetable shopping and/or consumption habit by calculating a “habit score.”

In this study, certain behaviors appear to stand out when it comes to those who have fruit and vegetable consumption habits. For example, consumers who have fruit and vegetable habits consume fruits and vegetables at a higher frequency compared to non-habituated consumers. Individuals eat more fruits and vegetables — as well as a wider variety of them — when shopping and consumption are automatic, or not requiring much thought. Fresh is the top form consumed for all levels of consumption.

**Fresh is the top form consumed for all levels of consumption.**



## Shopping & Consumption Automaticity Among Habitual & Non-Habitual Fruit & Vegetable Eaters

### FRUIT EATERS

**Habitual fruit shoppers consume more cups of fruit per day than non-habitual shoppers.** Figure 7 demonstrates that, among fruit habit shoppers, 37% consume more than three cups per day (significantly higher than non-habit fruit shoppers), 37% consume two cups per day, and 26% consume less than two cups per day. Just 22% of non-fruit habit shoppers consume more than three cups per day, while 35% consume two cups daily, and 43% consume less than two daily cups (significantly more than fruit habit shoppers).

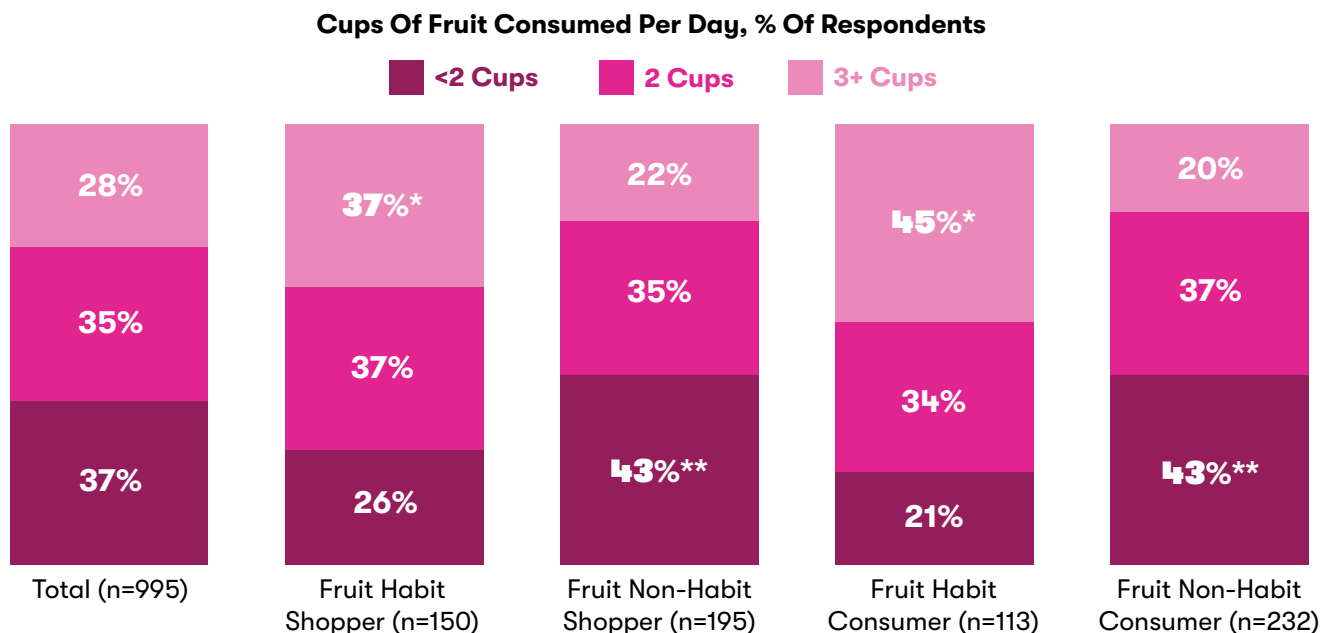
**Habitual fruit consumers eat more cups of fruit per day than non-habitual consumers.** Also illustrated in Figure 7, among fruit habit consumers, 45% consume more than three cups per day (significantly higher than non-habit fruit consumers), 34% consume two cups per day, and 21% consume less than two cups per day. Just 20% of non-fruit habit consumers have more than three cups per day, while 37% consume two cups daily, and 43% consume less than two daily cups (significantly more than fruit habit consumers).

**Those who have fruit shopping and consuming habits are more likely to eat fruit seven or more times per week.** Forty-one percent of those with fruit shopping habits eat fruit seven or more times weekly compared with 28% of those who do not have fruit shopping habits. Additionally, 40% of consumers with fruit consumption habits eat fruit seven or more times per week, compared to 30% of those who do not have fruit consumption habits.

**FIGURE 7: Cups Of Fruits Eaten Based On Shopping & Consuming Habits**

**QUESTION: How many cups of fruit would you say you eat in a typical day?**

Fruit Eaters (randomly selected for automaticity)



**Bold** number indicates statistically significant at a 95% confidence level; \*Significant to Non-Habit;  
 \*\*Significant to Habit (i.e. Habit Shopper vs. Non-Habit Shopper)



## VEGETABLE EATERS

### Habitual vegetable shoppers eat more cups of vegetables per day than non-habitual shoppers.

Among vegetable habit shoppers, 38% consume more than three cups per day (significantly higher than non-habitual vegetable shoppers), 34% consume two cups per day, and 28% consume less than two cups per day. Just 18% of non-vegetable habit shoppers consume more than three cups per day, while 44% consume two cups daily, and 38% consume less than two daily cups (Figure 8).

### Habitual vegetable consumers eat more cups of vegetables per day than non-habitual consumers.

Among vegetable habit consumers, 45% consume more than three cups per day (significantly higher than non-habitual vegetable eaters), 31% consume two cups per

day, and 24% consume less than two cups per day. Just 17% of non-vegetable habit shoppers consume more than three cups per day, while 44% consume two cups daily (significantly higher than habitual vegetable eaters), and 39% consume less than two daily cups (significantly higher than habitual vegetable eaters) (Figure 8).

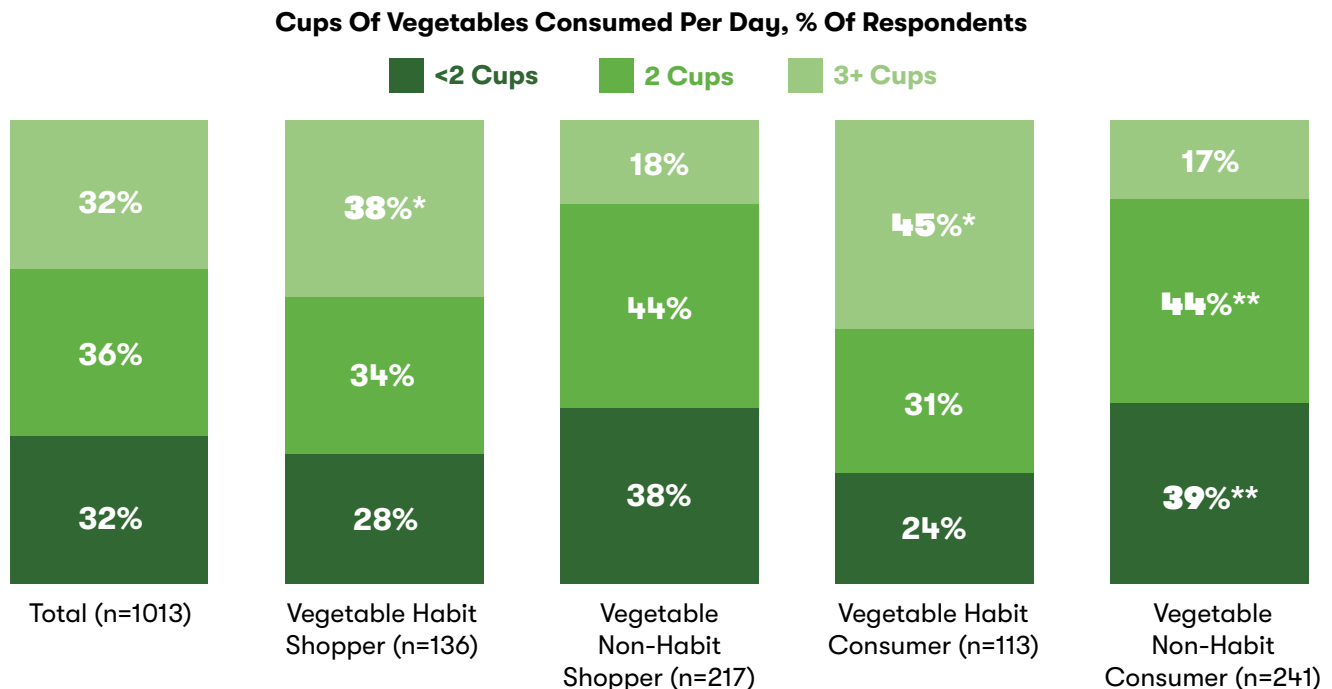
### Those who have vegetable shopping and consumption habits are more likely to eat vegetables seven or more times per week.

Fifty-three percent of those with vegetable shopping habits eat vegetables seven or more times weekly compared with 39% of those who do not have vegetable shopping habits. Additionally, 61% of consumers with vegetable consumption habits eat vegetables seven or more times per week, compared to 37% of those who do not have vegetable consumption habits.

**FIGURE 8: Cups Of Vegetables Eaten Based On Shopping & Consuming Habits**

**QUESTION: How many cups of vegetables would you say you eat in a typical day?**

Vegetable Eaters (randomly selected for automaticity)



**Bold** number indicates statistically significant at a 95% confidence level; \*Significant to Non-Habit;

\*\*Significant to Habit (i.e. Habit Shopper vs. Non-Habit Shopper)



## Shopping & Consumption Automaticity Among High- & Medium- Frequency Fruit & Vegetable Eaters

### FRUIT EATERS

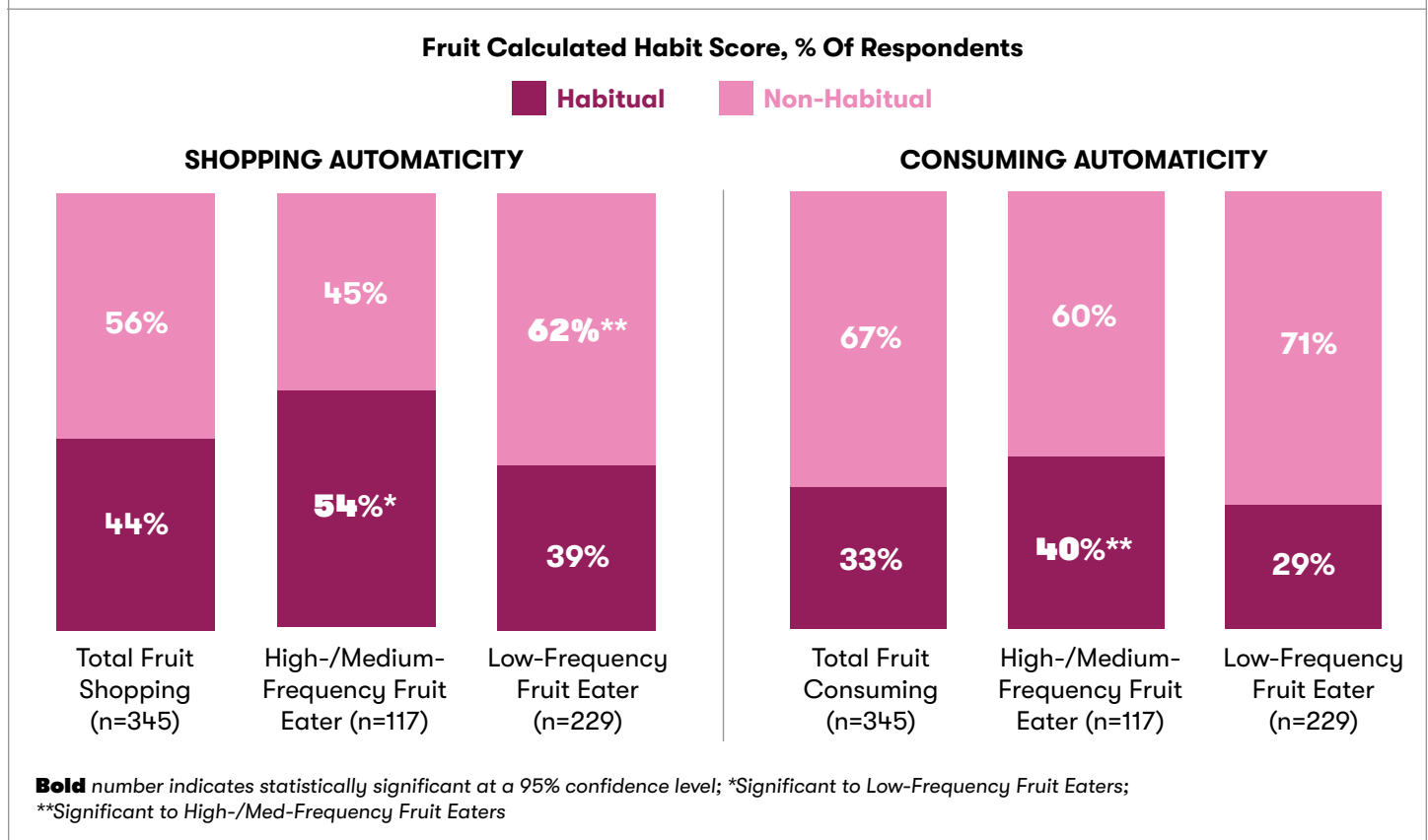
**High- and medium-frequency fruit eaters demonstrate higher levels of automaticity when it comes to shopping compared to low-frequency fruit eaters.** Among all fruit eaters in the study, habit shoppers comprise 44% of the sample, while the remaining 56% are non-habitual shoppers. For high- and medium-frequency fruit eaters, significantly more (54%) have a shopping

habit, while 45% do not. Among low-frequency eaters, a significant 62% do not have a shopping habit versus 39% who do (Figure 9).

**High- and medium-frequency fruit eaters demonstrate higher levels of automaticity when it comes to consumption compared to low-frequency fruit eaters.** Among all fruit eaters in this study, 33% have a consumption habit, while 67% do not. For high- and medium-frequency fruit eaters, 40% have a consumption habit, while 60% do not. Among low-frequency eaters, only 29% have a consumption habit versus 71% who do not (Figure 9).

**FIGURE 9: Shopping & Consuming Automaticity For Fruit Among High-/Medium- & Low-Frequency Eaters**

Fruit Eaters (randomly selected for automaticity)



## VEGETABLE EATERS

**High- and medium-frequency vegetable eaters demonstrate higher levels of automaticity when it comes to shopping compared to low-frequency vegetable eaters.** Among all vegetable eaters in this study, habit shoppers comprise 39% of the sample, while the remaining 61% are non-habitual shoppers. For high- and medium-frequency vegetable eaters, 47% have a shopping habit, while 53% do not. Among low-frequency eaters, 37% have a shopping habit, while 63% do not (Figure 10).

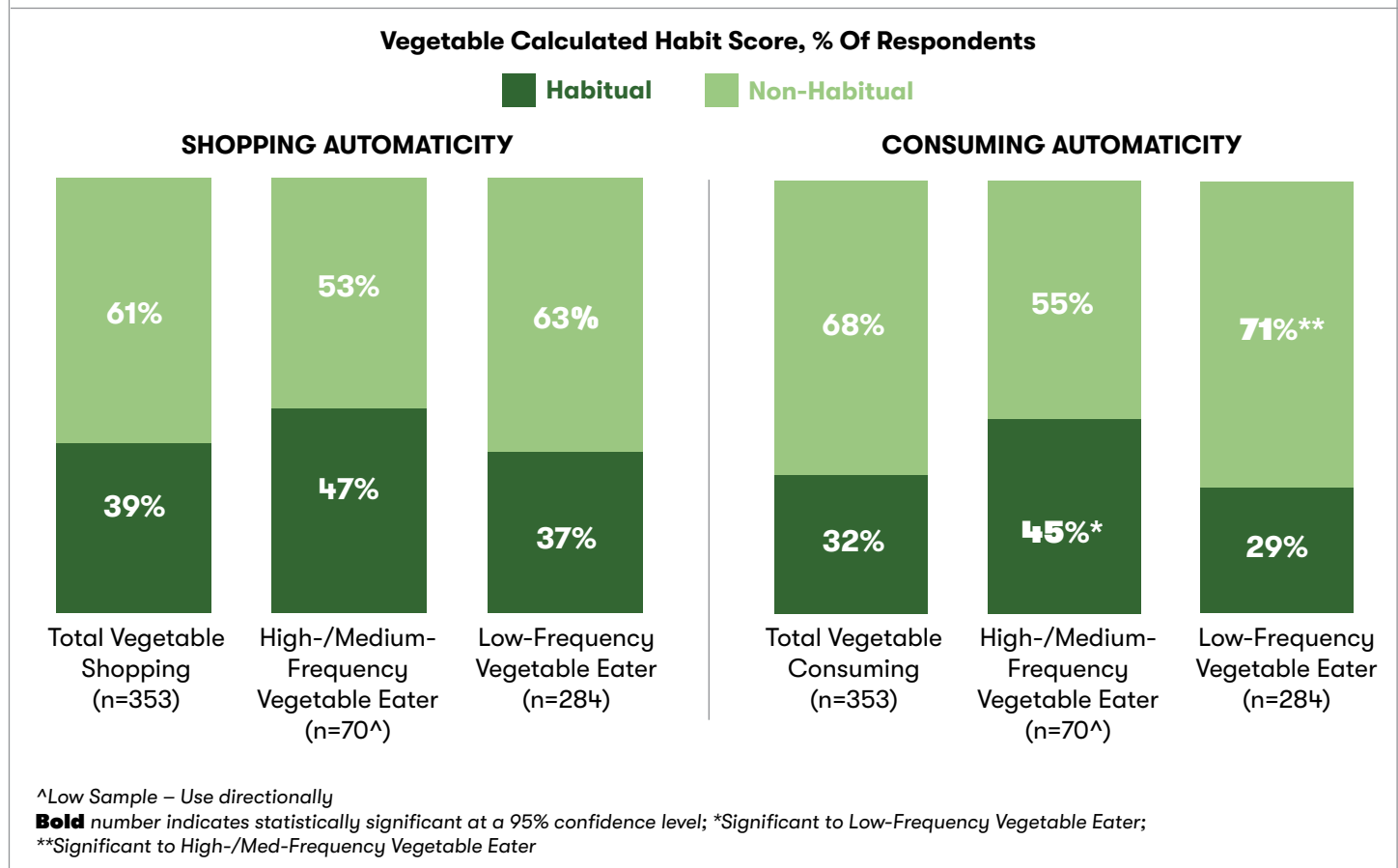
**High- and medium-frequency vegetable eaters demonstrate higher levels of automaticity when it comes to consumption compared to low-frequency vegetable eaters.** Among all vegetable consumers in

**Shopping automaticity is stronger than consuming automaticity. Once fruits and vegetables are in the home, more ease is required to prepare and consume.**

this study, 32% have a consumption habit, while 68% do not. Among high- and medium-frequency vegetable eaters, a significant percentage (45%) have a consumption habit, while 55% do not. For low-frequency consumers, a significant 71% do not have a consumption habit versus 29% who do (Figure 10).

**FIGURE 10: Shopping & Consuming Automaticity For Vegetables Among High-/Medium- & Low-Frequency Eaters**

Vegetable Eaters (randomly selected for automaticity)



## KEY FINDING: High-Frequency Eaters Have More Fruit & Vegetable Habits

As previously explored, higher levels of shopping and consumption automaticity are observed among those with fruit and/or vegetable habits, as well as those who consume them more frequently. However, those with fruit and vegetable habits are not necessarily high-frequency consumers of fruits and/or vegetables. Characteristics and nuances exist between consumption frequency groups.

### HIGH-FREQUENCY FRUIT EATERS

**High-frequency fruit eaters consume a greater number of types on a day-to-day basis and a greater amount of fruits overall.** On average, 36% of fruit consumers eat one type per day, and 34% consume

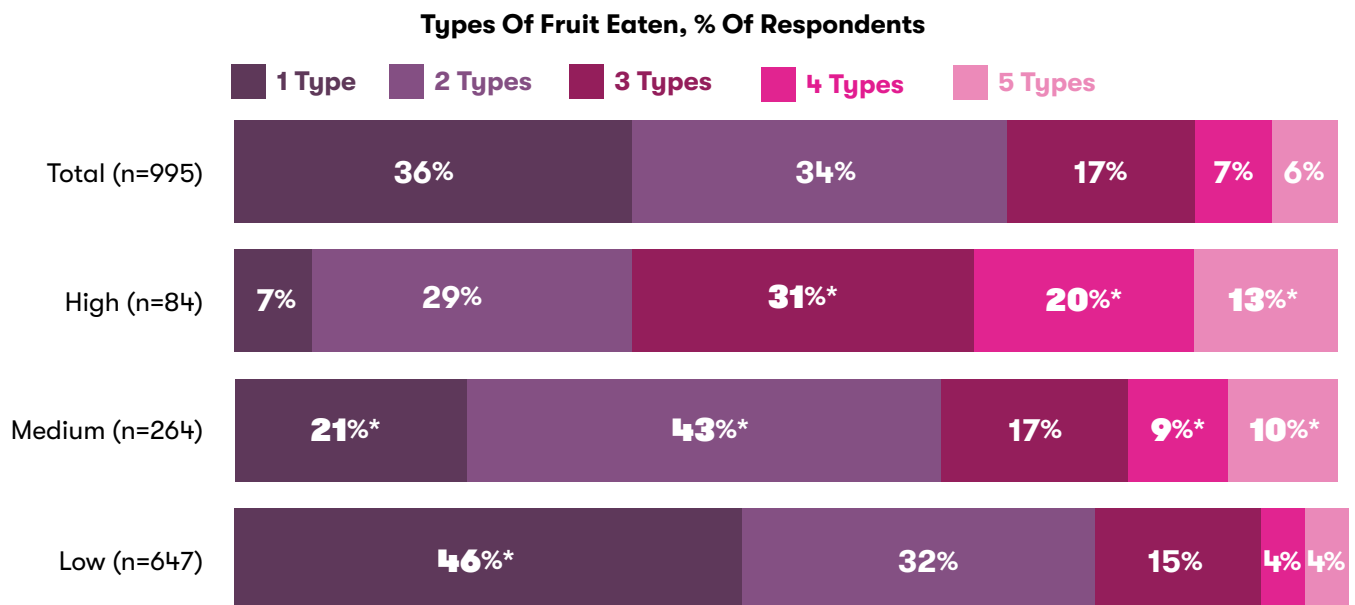
two types. Only 30% of consumers eat three or more types per day. Among high-frequency fruit eaters, only 7% eat one type per day. The majority eat more – two types (29%), three types (31%), four types (20%) and more than five types (13%). This contrasts with medium- and low-frequency fruit eaters: 21% of medium-frequency fruit eaters consume one type and 43% eat two types per day, whereas 46% of low-frequency fruit eaters consume one type and 32% consume two types per day (Figure 11).

On average, 28% of fruit eaters consume more than 3 cups per day. Seventy-six percent of high-frequency fruit consumers, 35% of medium-frequency fruit consumers, and 19% of low-frequency consumers eat more than three cups per day.

**FIGURE 11: Number Of Types Of Fruits Eaten Among High-, Medium- & Low-Frequency Fruit Eaters**

**QUESTION: In a typical day, how many types of fruit do you eat (such as apples, bananas, pears, etc.)?**

Fruit Eaters (n=995)



**Bold** number indicates statistically significant at a 95% confidence level; \*Significant to at least one other user group

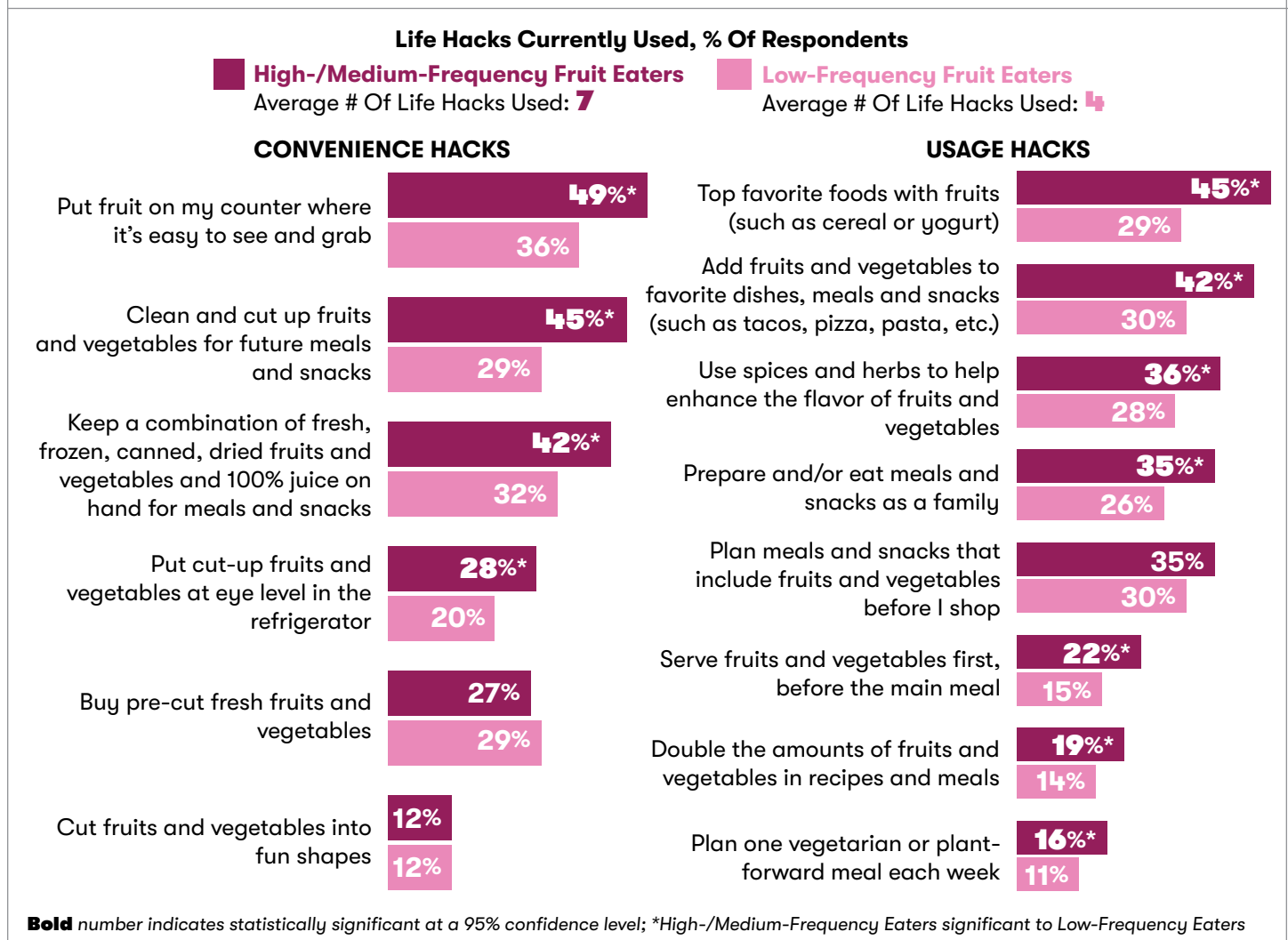
**High- and medium- frequency fruit eaters rely more on food hacks compared to low-frequency fruit eaters.** As shown in Figure 12, high- and medium-frequency fruit eaters use the following convenience hacks significantly more than low-frequency fruit eaters: keeping fruit on the counter (49% vs. 36% low-frequency), prepping fruit ahead of time for use later (45% vs. 29% low-frequency), keeping all forms on hand (42% vs. 32% low-frequency), and putting prepped produce at eye level in the refrigerator (28% vs. 20% low frequency).

Also in Figure 12, high- and medium-frequency fruit eaters use the following usage hacks significantly more than low-frequency fruit eaters: topping favorite foods (e.g., cereal, yogurt) with fruit (45% vs. 29% low-frequency), adding fruits to their favorite dishes (42% vs. 30% low-frequency), enhancing flavor with spices and herbs (36% vs. 28% low-frequency), and preparing and/or eating meals as a family (35% vs. 26% low-frequency).

**FIGURE 12: Hacks Used Among High-/Medium- & Low-Frequency Fruit Eaters**

**QUESTION: Below are some 'life hacks' for eating more fruit and vegetables. Which of these life hacks do you currently use?**

Low-Frequency Fruit Eater (n=647); High-/Med-Frequency Fruit Eater (n=348)





## HIGH-FREQUENCY VEGETABLE EATERS

**High-frequency vegetable eaters consume a greater number of types on a day-to-day basis, and a greater amount of vegetables overall.** On average, 25% of vegetable consumers eat one type per day and 39% consume two types. Approximately 35% of consumers, on average, eat three or more types per day. Among high-frequency vegetable eaters, only 1% eat one type per day. The majority of high-frequency vegetable consumers eat more variety — two types (28%), three types (43%), four types (10%) and more than five types (18%). This contrasts with medium- and low-frequency vegetable eaters: 10% of medium-frequency vegetable eaters consume one type, and 37% eat two types per day, whereas 31% of low-frequency vegetable eaters consume one type, and 41% consume two types per day (Figure 13).

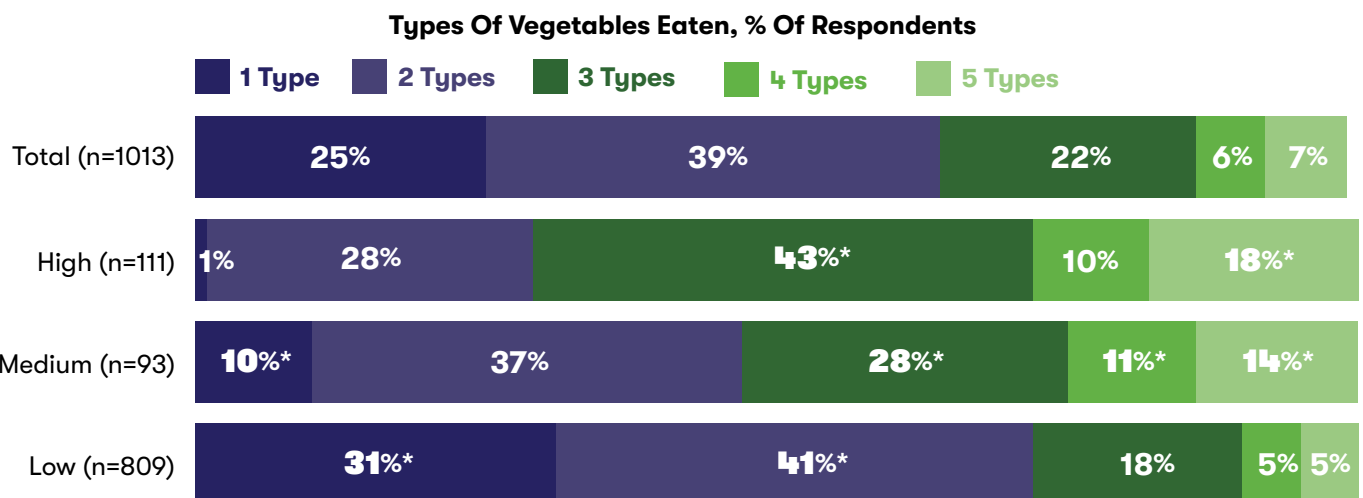
On average, 32% of vegetable eaters consume more than 3 cups per day. Sixty-seven percent of high-frequency vegetable consumers, 54% of medium-frequency fruit consumers, and 25% of low-frequency consumers eat more than three cups per day.

**High-frequency vegetable consumers indicate more intention to use hacks, once they're aware of them, compared to low-frequency vegetable consumers.**

**High- and medium- frequency vegetable eaters rely more on hacks compared to low-frequency consumers.** As shown in Figure 14, high- and medium-frequency vegetable eaters use the following convenience hacks significantly more than low-frequency vegetable eaters: having a variety of fruit and vegetable forms on hand (47% vs. 32% low-frequency) and having ready-to-use vegetables for easy meal starters (35% vs. 25% low-frequency). Another popular hack among high- and medium-frequency vegetable eaters is prepping produce ahead of time (40%), although this convenience hack was not used significantly more than low-frequency eaters.

**FIGURE 13: Number of Types of Vegetables Eaten Among High-, Medium- & Low-Frequency Eaters**

**QUESTION: In a typical day, how many types of vegetables do you eat (such as broccoli, celery, lettuce, etc.)?**  
Vegetable Eaters (n=1013)



**Bold** number indicates statistically significant at a 95% confidence level; \*Significant to at least one other user group

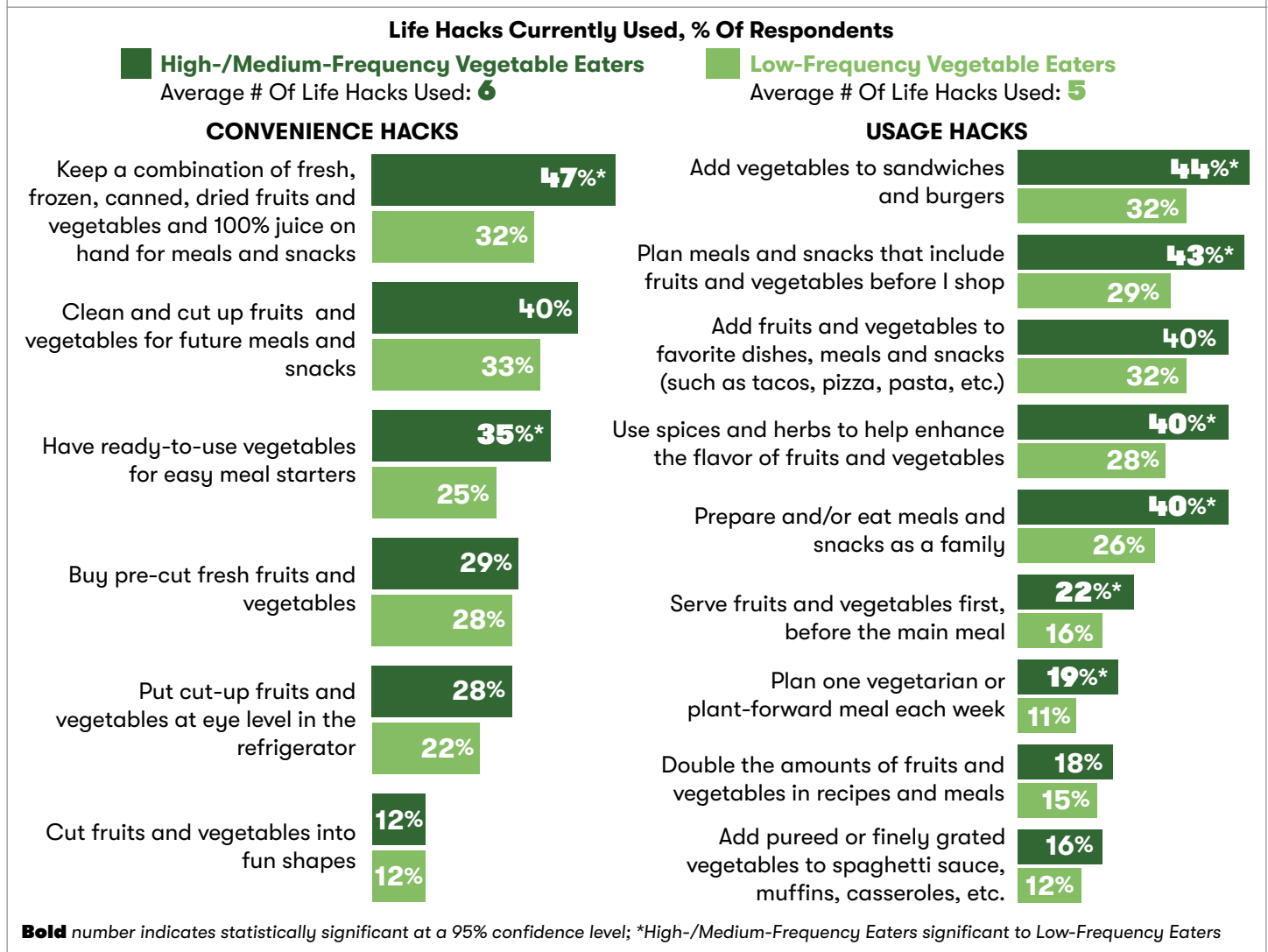
Additionally, high- and medium-frequency vegetable eaters use the following usage hacks significantly more than low-frequency fruit eaters: adding vegetables to sandwiches and burgers (44% vs. 32% low-frequency), planning ahead to serve meals and snacks that include vegetables (43% vs. 29% low-frequency), enhancing flavor with spices and herbs (40% vs. 28%), preparing and/or eating meals and snacks as a family (40% vs. 26% low-frequency), serving produce before the main meal (22% vs. 16% low-frequency), and planning one vegetarian or plant-forward meal each week (19% vs. 11% low-frequency).

Another popular hack among high- and medium-frequency vegetable eaters is adding produce to favorite dishes, meals, and snacks (40%), although this usage hack was not used significantly more than low-frequency eaters (Figure 14). Interestingly, high-frequency vegetable consumers indicate more intention — or more opportunity — to use hacks, once they're aware of them, compared to low-frequency vegetable consumers, potentially indicating a difference in confidence levels when translating awareness to intent or adoption of the hacks.

**FIGURE 14: Hacks Used Among High-/Medium- & Low-Frequency Vegetable Eaters**

**QUESTION: Below are some 'life hacks' for eating more fruit and vegetables.  
Which of these life hacks do you currently use?**

Low-Frequency Vegetable Eater (n=809); High-/Med-Frequency Vegetable Eater (n=204)



## KEY FINDING: Low-Frequency Fruit & Vegetable Consumers Can Build Habits From Hacks

There are several ways in which perceptions and actions of low- and/or medium-frequency produce consumers differ from those who have more frequent (high-frequency) consumption, coinciding with the KNOW-FEEL-DO Behavioral Framework. Table 2 shows that a common theme among low-frequency fruit eaters, as well as low- and medium-frequency vegetable eaters, is that they report not knowing how to prepare fruits or

vegetables in different ways. Low- and medium-frequency fruit eaters feel it's hard to find fruit and vegetable options that everyone in their house enjoys. Low-frequency vegetable eaters say it's hard to find fruit options that everyone in their house enjoys. Finally, low-frequency fruit and vegetable eaters report that, unless they plan ahead, buying fruits and vegetables isn't something they typically do.

**TABLE 2: Attitudes Among High-, Medium- & Low-Frequency Fruit & Vegetable Eaters**

**QUESTION:** Please tell us how much you agree or disagree with each of the following statements.

Seven Point Scale

**Attitudes On Fruits and Vegetables, % Of Respondents Top 3 Box - Agree**

		FRUIT EATER			VEGETABLE EATER		
	Total (n=1024)	High (n=84)	Medium (n=264)	Low (n=647)	High (n=111)	Medium (n=93)	Low (n=809)
I know how to select and store fruits and vegetables for the best eating experience possible	73%	88%*	76%	72%	76%	81%	73%
Preparing and cooking meals with fruits and vegetables is something I enjoy doing	73%	91%*	78%*	70%	88%*	77%	71%
I feel a sense of pride when I feed my family fruits and vegetables at meals and snacks	72%	84%*	75%	71%	74%	74%	73%
Fruits and vegetables are expensive	50%	43%	51%	50%	51%	56%	48%
It's hard to find vegetables that everyone in my house likes	36%	21%	34%*	38%*	28%	31%	37%
It's hard to find fruits that everyone in my house likes	29%	12%	23%*	34%*	18%	26%	31%*
I don't know how to prepare fruits or vegetables in different ways	29%	16%	24%	32%*	15%	29%*	31%*
Unless I plan ahead, buying fruits and vegetables isn't something I typically do	28%	16%	20%	32%*	15%	23%	30%*

**Bold** number indicates statistically significant at a 95% confidence level; \*Significant to at least one other user group

**Regardless of consumption frequency, more than half of respondents prepare fresh fruits and vegetables at home.** Fresh is prepared significantly more by high- (65% fruits, 64% vegetables) and medium-frequency (62% fruits, 54% vegetables) fruit and vegetable eaters. Medium- and low-frequency fruit consumers use 100% fruit juice and dried fruit on a significantly higher basis. Low-frequency fruit eaters consume significantly more canned fruit. Medium-frequency eaters prepare vegetables significantly more as canned (14%), 100% juice (7%), and dried (5%). Low-frequency vegetable eaters significantly prepare vegetables in all forms – fresh (48%), frozen (21%), canned (18%), 100% juice (8%), dried (5%).

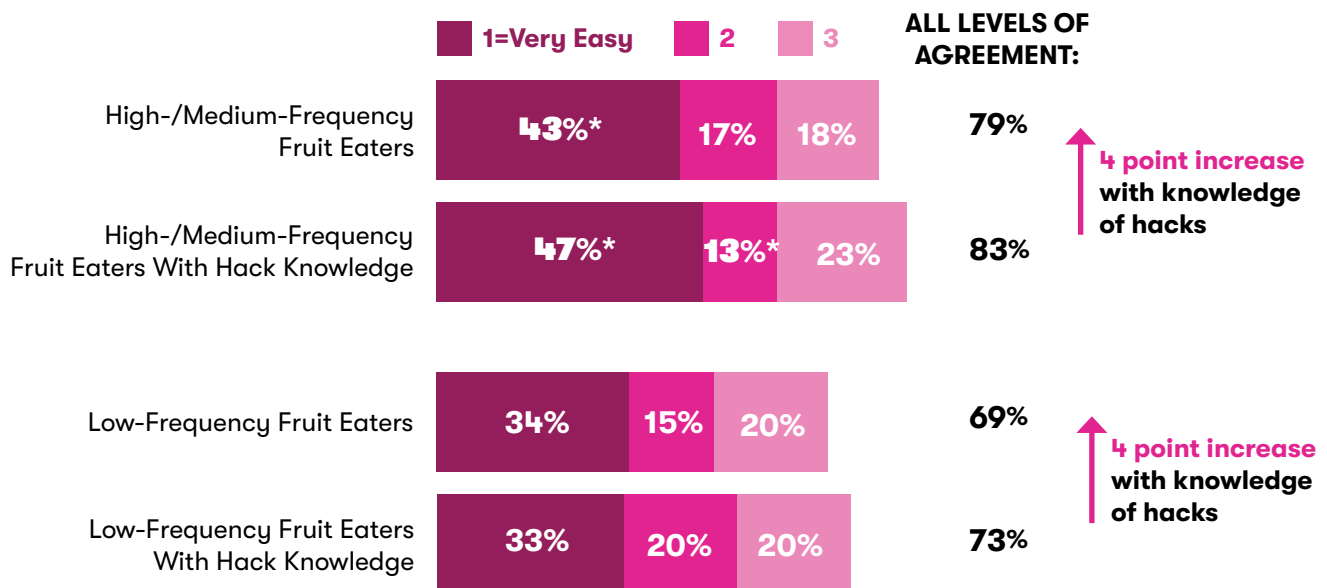
**Low-frequency fruit and vegetable eaters use some of the same hacks (tips and tricks) as high-frequency eaters, but to a lesser extent. When presented with hacks to make produce consumption easier, consumers' confidence in being able to double consumption grows.** In Figure 15, when asked how easy it would be to double their or their family's fruit consumption, there is a 4% increase among all fruit eaters once they are provided with consumption hack ideas (from 79% to 83% in high- and medium-frequency eaters and 69% to 73% in low-frequency eaters).

**FIGURE 15: Perceived Ease In Doubling Fruit Consumption Following Exposure To Hack Information**

**QUESTION #1: How easy would it be to double your consumption of the following food categories?**  
**QUESTION #2: Now that you know about these tips and tricks, how easy do you think it would be to double your or your family's consumption of the following food categories?**

High-/Med-Frequency Fruit Eaters (n=348); Low-Frequency Fruit Eaters (n=647)  
 Seven Point Scale: 1= Very Easy; 7= Very Difficult

**Ease Of Doubling Fruit Consumption, % Of Respondents Top 3 Box - Easy**



**Bold** number indicates statistically significant at a 95% confidence level; \*High-/Medium-Frequency Eaters significant to Low-Frequency Eaters



**Low-frequency fruit consumers are as likely as high-frequency fruit consumers to say hacks would work for them, once they're aware of the tips and tricks.**

These hacks include cleaning and cutting up produce for future meals and snacks; placing cut-up fruits and vegetables at eye level in the refrigerator; adding them to favorite dishes, meals, and snacks; planning meals and snacks that include produce before shopping; topping favorite foods (i.e. cereal, yogurt, etc.) with fruits; keeping all forms handy to eat; keeping fruit on the counter where it's top-of-mind; serving fruits and vegetables first (before the main meal); and buying pre-cut produce.

**Knowledge of hacks indicates the strongest potential increase in improving vegetable consumption among low-frequency eaters.** There is a 3% increase (68% to

**Low-frequency fruit and vegetable eaters can build confidence to double consumption through knowledge and use of hacks.**

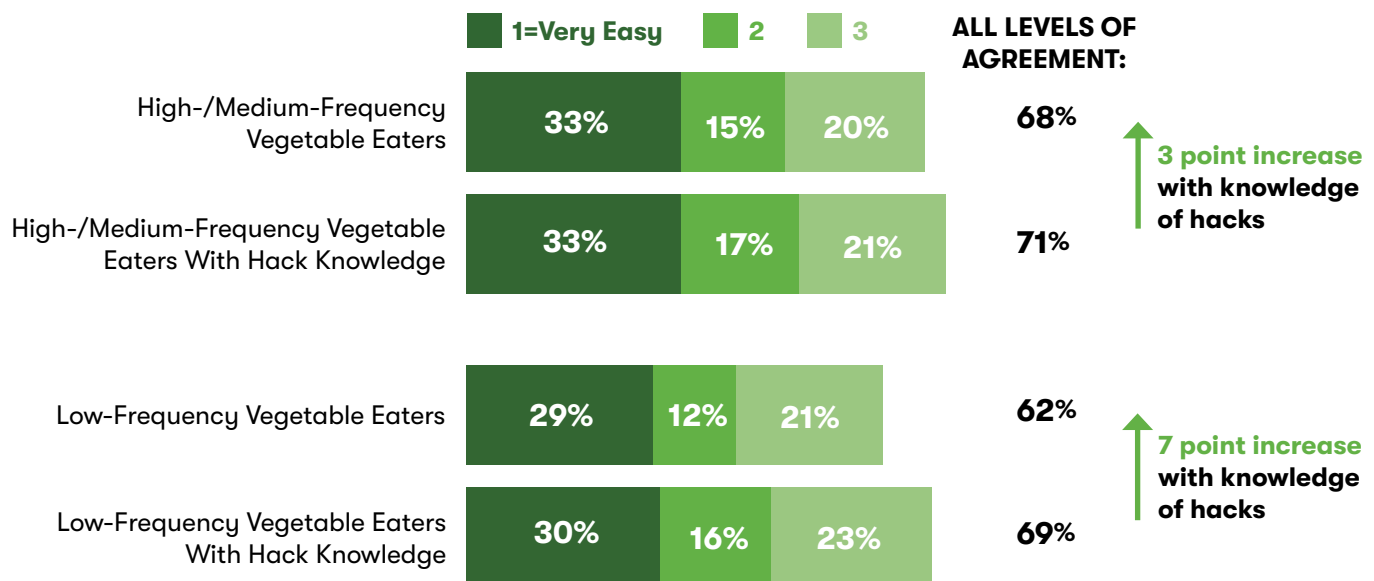
71%) in perceived ease to double vegetable consumption among high- and medium-frequency vegetable eaters after becoming aware of consumption hack ideas. The effect is greater among low-frequency eaters, with a 7% increase (from 62% to 69%), indicating that low-frequency fruit and vegetable eaters can build confidence through knowledge and use of hacks (Figure 16).

**FIGURE 16: Perceived Ease In Doubling Vegetable Consumption Following Exposure To Hack Information**

**QUESTION #1: How easy would it be to double your consumption of the following food categories?**  
**QUESTION #2: Now that you know about these tips and tricks, how easy do you think it would be to double your or your family's consumption of the following food categories?**

High-/Med-Frequency Vegetable Eaters (n=348); Low-Frequency Vegetable Eaters (n=647)  
 Seven Point Scale: 1= Very Easy; 7= Very Difficult

**Ease Of Doubling Vegetable Consumption, % Of Respondents Top 3 Box - Easy**



No statistical significance at a 95% confidence level reported

# SUMMARY & IMPLICATIONS

## Developing A System Of Habits

While habits can be encouraged and built similarly, closing the fruit and vegetable consumption gap will require building a system of habits spanning different stages of one's fruit and/or vegetable consumption journey — from planning and purchasing to eating and enjoying. Food, nutrition and health professionals — as well as the broad-based fruit and vegetable industry — can support Americans in building this system by providing behavior-based cues; creating frictionless, easy and enjoyable experiences; and showcasing the many immediate rewards of eating and enjoying fruits and vegetables.

In addition to the practical applications of shopping for, preparing and consuming fruits and vegetables, it may also be useful to apply a habit-centric approach to the Social-Ecological Model<sup>23</sup> and determine which levers among social and cultural norms and values, multiple sectors and settings as well as individual factors have the greatest impact on fruit and vegetable choices and consumption — and target those that are most likely to elicit habit formation and retention opportunities. For example, all federally funded programs, whether feeding programs, research or nutrition education, all work together to create a frictionless environment to support fruit and vegetable consumption habits — and treat this mandate as a national priority.<sup>24</sup>

Utilizing the KNOW-FEEL-DO Behavioral Framework to inform habit system development can be effective. For example, supporting consumers by ensuring they appreciate the role of knowledge and the power of habit, helping them feel the benefits of a reward and automaticity, and enabling them to repeatedly do the behaviors in easy and enjoyable ways. Of note, research continues to show habit formation interventions are most effective when they support individuals in adding an action to an existing routine, rather than encouraging a new behavior.<sup>25</sup>

**Food, nutrition and health professionals — as well as the broad-based fruit and vegetable industry — can support people in building this system by providing behavior-based cues; creating frictionless, easy and enjoyable experiences; and showcasing the many immediate rewards of eating and enjoying fruits and vegetables.**



## Turning Insights Into Action

Within the context of the KNOW-FEEL-DO Behavioral Framework, consumers need support in building habits and systems of habits that inspire capacity for greater fruit and vegetable consumption. Importantly, there is no single, easy answer for increasing fruit and vegetable consumption; habits across many contexts need to be changed and formed.

The following are insights and takeaways from this research that can serve as a foundation for consumer-centric messaging and initiatives to improve fruit and vegetable consumption.

- Knowledge of hacks may supplement skill-building deficits, bringing the KNOW-FEEL-DO Behavioral Framework full circle.
- Feeling consists of immediately connecting emotionally and cultivating enjoyment over time – and the optimal and most immediate avenue to fostering feeling is taste. An enjoyable taste experience is an immediate reward that can give way to emotions such as pride.
- Behaviors throughout the consumption journey – planning, shopping, storing, preparing and consuming – are distinct in their ability to inform new habits. For instance, the shopping experience may focus on helping consumers find, see, select and buy fruits and vegetables – while preparing may focus on learning about new flavors as well as simple hacks for cutting, preparing, cooking and serving them.
- Encouraging actions that build upon consumers' existing routines can be more effective than promoting a new behavior. This includes the ability to identify current habits to “piggyback” on. For example, pairing fruits and vegetables with foods they may be commonly consume (e.g., hot and cold cereals for fruit, salads, burgers and sandwiches for vegetables) or incorporating greater consumption during mealtime routines (fruit is consumed most frequently at breakfast and vegetables at lunch and dinner).

**There is no single, easy answer for increasing fruit and vegetable consumption; habits across many contexts need to be changed and formed.**





- Focusing on consumption of all fruit and vegetable forms may be an area in which existing habits can be reinforced and built upon, particularly among low-frequency eaters.
- Messaging specifically about prepping shortcuts, adding to commonly eaten foods and doubling amounts in recipes could boost vegetable use among low-frequency vegetable eaters.
- Building opportunities for repetition, consistency of context, reward and ease is essential to developing patterns of habit formation.
- Reminding consumers — before they’ve established automaticity — that failures are okay, and that all attempts (not just successful ones) count can help evolve and reinforce habit formation.
- When failures occur, it’s key to determine if the deficiencies occurred with repetition, consistency of context, reward, and/or ease.
- It will be important to recognize that habit opportunities to increase fruit consumption and to increase vegetable consumption will likely be different, based on different motivations for consuming them; unique barriers to shopping, preparing and eating them; variation in types of foods, meals and meal occasions in which they are consumed; and different consumption habits inside and outside the home. For example, hand fruit like apples can be consumed as a snack habit, repeated daily after work. Few vegetables can be consumed in this isolated manner with zero preparation. Vegetable habits may thus need to piggyback on meal preparation activities; for example, developing a daily habit of adding a vegetable to every dinner meal they prepare at home or eat at a restaurant.
- Successful hacks and habits will not only differ between and among fruits and vegetables, but also across and within families, as well as individuals. Each person’s consumption journey is unique, and personalized approaches will be instrumental to closing the consumption gap with enduring habits.

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## Taking The Data To The Next Level

As a relatively new area of study, behavioral science on fruit and vegetable consumption should continue to be advanced to help effectively close the consumption gap. Additionally, the habit score, a newly developed tool, should be studied in future research and validated. Finally, a greater understanding of selection behaviors at foodservice and at retail as well as various consumption contexts may offer relevant insights to building effective habits and systems of habits moving forward.

Research questions to build upon this study may include, but are not limited to:

- What are the most effective foodservice selection, shopping, preparation, and consumption habits that consumers have? Which are easiest, most rewarding, and most likely to be repeated?
- Which specific fruit and vegetable habits are most common? Which ones are most easily developed? For which fruits and vegetables?
- What fruit and/or vegetable hacks most support increased consumption among consumers?
- What habit-prompting messages or tools are most effective?
- Is it most effective to take a broad or focused approach to hacks that are actionable across the consumption journey?

In summary, the art and science of habit formation related to fruit and vegetable consumption is more intricate than it appears. While it may seem obvious to postulate that individual consumption behavior is based on automatic actions not requiring much thought, the science of fruit and vegetable consumption automaticity is in its infancy and what we learn in this study, and in future research, may make a significant difference in more closely aligning fruit and vegetable consumption with U.S. dietary guidance for optimal health and well-being.





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