

Introduction

Surprisingly little is known about the role snacking plays in the overall diet of young adults. Studies done related to eating behavior and food choices have rarely focused specifically on snacking patterns, according to Hartline-Grafton, Nyman, Breifel & Cohen (2004). In fact, their meta-analysis of several food related surveys used in nutrition research suggests that questions pertaining specifically to snacking patterns in any population group are scarce.

However, snacks comprise a fast-growing area of the food industry. According to the '*Snack Foods*' report by Global Industry Analysts, the global snack market will be worth almost \$300 billion by 2010 (Food Navigator-USA, 2008). The report also predicted that the global volume sales of snack foods would increase by 9.8 million US tons in the next three years.

With the number of snacking instances on the rise, it is important to determine the affects of snacking on health. Lloyd-Williams, Mwatsama, Ireland & Capewell's (2008) survey examining the impact on coronary heart disease of replacing one 'unhealthy' snack with one 'healthy' snack suggests that snacking increases calorie intake and fat and salt levels in the body. However, healthy snacks help people meet the recommended daily intake for fruits, vegetables, and certain vitamins and minerals (Sebastian, Cleveland, & Goldman, 2008). Therefore, it is important to first understand why people choose unhealthy snacks before implementing tools to motivate people to choose healthier snacks.

In this literature review, the following questions are addressed:

- How are healthy and unhealthy snacks defined?
- How have snacking habits changed over the years?
- What are common snacking behaviors?
- What are the deterrents and motivators for healthy snacking?
- What are the nutritional implications of snacking?

Definition of a Snack

Gatenby's (1997) study, "Eating frequency: methodological and dietary aspects," attempts to clarify the terminology of eating patterns in order to determine the nutritional implications of increased eating frequency. The study suggests that the difference between "snacks" and "meals" depends on the time the food is consumed and/or the nutrient composition of the food. Gatenby (1997) relates that most researchers define a snack as a smaller, less structured meal that is not eaten during regular meal times - breakfast (morning), lunch (midday), and dinner (evening). Furthermore, researchers generally categorize snacks as either "unhealthy" or "healthy" in order to study the affects of snacks on health (Lloyd-Williams et al., 2008).

Unhealthy Snacks

According to Lloyd-Williams et al. (2008), unhealthy snacks carry little nutritional value and have a high content of refined sugars, saturated fat, and salt. Their study specifically defined unhealthy snacks as: chocolate bars, chips, cakes, and pastries. Pei-Lin (2004) conducted a study that explored factors influencing the selection of healthy and unhealthy snacks among students at the University of Newcastle in Australia. Respondents in his study also defined unhealthy

snacks as foods with high levels of sugar and fat; however, many respondents included processed foods in their definitions of unhealthy snacks.

Healthy Snacks

Healthy snacks are low in fat, sugar, sodium, and calories (Mayo Clinic, 2008). Healthy snacks include whole-grain foods, fruits and vegetables, nuts and seeds, and low-fat dairy products (Lloyd-Williams et al., 2008; Mayo Clinic, 2008). When asked to define healthy snacks, the University of Newcastle students in Pei-Lin's (2004) study suggested vegetables, fruits, and foods with high-fiber, low-fat, and low-sodium levels.

Snacking Habits

Snacking is more common today than ever before. People are eating more snacks, more often. According to Heller (2006), in a given year the typical US consumer eats 231 snacks in the morning, 283 snacks in the afternoon, and 261 snacks in the evening, which averages to 2.12 snacks per day. Cross, Babicz, & Cushman surveyed 805 adults, 18 to 54 years old, about their snacking habits and found the following self-reported snacking behaviors: 25% of the adults snacked a few times a week or less, 25% snacked once a day, 40% snacked 2-3 times per day, and 10% snacked four or more times per day.

Moreover, the number of calories per snacking occasion and frequency of snacking occasions have increased significantly (Zizza, Siega-Riz, & Popkin, 2000). Zizza et al. (2000) analyzed data from 3 USDA surveys, which included 4,472 respondents from a 1977-78 nationwide food consumption survey, 2,373 respondents from the 1989-91 Continuing Survey of Food Intake by Individuals, and 1,648 respondents from the 1994-96 Continuing Survey of Food Intake by Individuals. Analysis of the data revealed a growing preference for both higher calorie snacks and more frequent snacking – especially for young adults (19-29). Zizza et al. (2000) reported that the calorie intake per snacking occasion increased 26% between 1977 and 1996 (from 247 calories to 313 calories per day). Meanwhile, the number of times this age group snacked increased 14% (from 1.70 snacks to 1.92 snacks per day).

Snacking Behaviors

Adult snacking behaviors have not been widely researched. There is more research about the snacking patterns of adolescents compared to adults. While this research does not directly relate to adult snacking habits, it provides valuable insight for the next generation of adults. Savige et al. (2007) surveyed 3,250 secondary students in seventh and ninth grade from Victoria, Australia about snacking behaviors and frequencies of meal skipping. The study found that students were most likely to snack after school (4.6 snacks per week), while watching TV (3.5 snacks per week), and while hanging out with friends (2.4 snacks per week). Females reported that they were more likely to snack on the run, while they were hanging out with friends, or while doing homework. Males reported that they were more likely to snack daily on the way to or from school and in the middle of the night.

Savige et al. (2007) also found that adolescents that lived in different regions reported different snacking habits. Adolescents living in metropolitan areas were more likely to snack in the middle of the night, while doing homework, or while watching TV. On the other hand, adolescents that did not live in metropolitan areas were more likely to snack every day after school.

Healthy Snacking: Deterrents & Motivation

Deterrents

Studies have found that there are a variety of reasons that deter adults from eating healthy snacks, including availability, convenience, social acceptance, and health claims (PR Newswire, 2006; Pei-Lin, 2004).

Availability and convenience are two important, related factors that influence respondents' choice of snacks. The Dannon Company commissioned StrategyOne to conduct a nationwide study of 330 professional women regarding their snacking habits and behaviors (PR Newswire, 2006). The study found that women snack on whatever is around the office, with 38% of the women snacking on the closest thing available. The participants in the study reported that while they liked fruits and nuts, they usually snacked on junk food since it was more accessible and easier to bring to work.

Pei-Lin (2004) reported that although the University of Newcastle students had knowledge of nutrition, their snack selection was mainly influenced by availability, social activities, and health claims. Like the respondents in The Dannon Company study, the students in Pei-Lin's (2004) study explained that they tended to snack on the closest thing available (or buy snacks from the closest cafeteria). However, they also disliked snacks labeled as "healthy," and ate unhealthier when around friends because they thought it was more socially acceptable to have a piece of chocolate than a carrot.

Motivation

Motivation for eating healthy snacks varies from person to person, however, Pei-Lin (2004) found that there are common motivators for healthier snacking, including improving weight and health and feeling better overall after eating a healthy snack.

According to Pei-Lin's (2004) study, respondents explained that they felt pleased after eating healthy snacks. Five of the respondents stated that they felt better, more alert, and more energetic after eating healthy snacks. The respondents also stated they would stop eating unhealthy snacks if they gained weight or were diagnosed with a disease, such as diabetes, hypertension, or cardiovascular disease (Pei-Lin 2004).

Nutritional Implications of Snacking

Snacking plays a dual-role in the diet; it provides vital nutrients, yet it also increases calorie and fat intake. In a study of the diets of 28 adolescents, ages 11-14, Howard and Reeves (2005) found that snack foods significantly increase the total intake of vitamins and minerals such as iron, zinc, folate, and calcium. However, the study also found that snacking contributes to excessive levels of fat in the body.

One benefit of snacking is that it helps individuals meet the recommendations outlined in the USDA's MyPyramid Food Guidance System. Sebastian, Cleveland, & Goldman (2008) examined the 24-hour recall of food intake by 4,357 adolescents (12-19 years old) from the National Health and Nutrition Examination Surveys (2001-2004) and found that snacking frequency significantly improved the likelihood of meeting fruit recommendations for both genders, while also helping boys meet the daily recommended intake for milk and oils. However, the study also reported that snacking significantly increases the intake of calories and sugars.

Cutting out unhealthy snacks and replacing them with healthy snacks can have a positive effect on peoples' health. Lloyd-Williams et al. (2008) found that replacing one unhealthy snack with one healthy snack each day can reduce 4.41 grams of saturated fat and 0.51 grams of sodium intake. Since increased saturated fat and salt intake are linked to cardiovascular disease, the change from unhealthy to healthy snacks is very beneficial (Lloyd-Williams et al., 2008). After calculating the decrease in saturated fat and salt in the average person's diet, Lloyd-Williams et al. (2008) reported that if everyone in the United Kingdom switched one unhealthy snack for one healthy snack a day, around 6000 deaths from cardiovascular disease could be prevented every year.

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