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The Go Wild with Whole Grains! School-Based Program: Positive Impacts Among Children

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Abstract. Whole grain foods have been associated with health benefits, yet they are under consumed by youth compared to recommendations. This study evaluated impacts of a school-based curriculum among children in grades 3–5 to address barriers to intake (2018–2019) (n = 1,748). Surveys before and after the program indicated youth were more willing to try and better able to identify whole grain foods. Open-ended responses confirmed findings regarding increased ability to identify whole grain foods, increased preferences, and perceptions of availability. Together, these impacts could increase the likelihood that youth can meet whole grain intake recommendations to improve diet quality and health.

INTRODUCTION

Whole grain foods provide health benefits from nutrients, fiber, and other bioactive components (Björck et al., 2012; Călinoiu & Vodnar, 2018). Review studies have shown dose-response relationships between whole grain consumption and reduced risk of all-cause mortality and mortality from cardiovascular disease and cancers (Benisi-Kohansal et al., 2016) and an inverse relationship with occurrence of type 2 diabetes (Chanson-Rolle et al., 2015). However, most adolescents do not meet USDA's current recommendations for eating 50% of total grains as whole grains (U.S. Department of Agriculture and U.S. Department of Health and Human Services [USDA, USDHHS, 2020]. Whole grain intake among adolescents based on 2017–2018 National Health and Nutrition Examination Survey data was only 0.84 ounce equivalents (oz eq) versus 6.39 oz eq of refined grain (Bowman et al., 2021).

Barriers to whole grain intake have been identified among children and adolescents based on a review of the literature by Meynier et al. (2020), including disliking taste/texture, limited availability, lack of appeal regarding appearance/marketing, time to prepare and eat, difficulty in identifying these foods, cost, and lack of knowledge regarding health benefits. Kamar et al. (2019) conducted camera image-assisted interviews with adolescents to identify factors that limited whole grain intake. Barriers included difficulty in identifying these foods and their health benefits, and poor availability at home and away from home. Suggested ways

to address these barriers were approaches tailored by age group (Kamar et al., 2019) and increasing availability, variety, ability to identify whole grain foods, and sensory appeal to enhance enjoyment (Meynier et al., 2020). Others have also reported barriers for low-income adult populations, including cost and difficulty in correctly identifying whole grain foods (Chea & Mobley, 2019).

In response to the low number of youth meeting whole grain recommendations and studies of barriers to intake, the Go Wild with Whole Grains! program was developed and implemented with students in grades 3–5. The learning objectives were to increase preferences for whole grain foods and knowledge of whole grains, expand the variety of whole grains consumed, and prepare and eat more whole grain foods. The purpose of this study was to evaluate whether the learning objectives of the Go Wild with Whole Grains! program were met following implementation in elementary schools. The program was part of school-based Supplemental Nutrition Assistance Program Education (SNAP-Ed) for schools meeting income eligibility criteria.

METHODS

DEVELOPMENT, IMPLEMENTATION, AND EVALUATION

The Go Wild with Whole Grains! curriculum was designed to involve students in Grades 3–5 in active, experiential learning. Students learned from a large flip book (or flip book presentation) that the nutrition educator used to share information and guide discussion. Lessons were organized

by type of whole grain, including wheat, oats, barley, brown and wild rice, and corn. Wild animal characters were used to make learning more enjoyable. Lessons included games, music, brain breaks or energizers (Lovett et al., 2014), tasting opportunities, and other activities to stimulate all five senses and keep students engaged throughout the whole lesson.

The multicomponent curriculum was implemented in classrooms in 25 schools in rural Northwest Minnesota, including one Indian reservation, during the 2018–19 school year. One monthly lesson was presented by a nutrition educator (n=7) for six months with assistance from the classroom teacher (n=52) who led special activities and reinforced nutrition messages with the help of an activity resource manual. Food service staff included whole grains in school menus and used promotion information from a resource manual. Newsletters were sent to student's families asking them to accept the "challenge" of buying and preparing whole grain dishes with their children.

Before and after the program, students responded to survey statements, "I like to try new whole grain foods" (*yes/no* [Laureati et al., 2015]) and "I know how to tell if a food is whole grain" (*yes/no* [Burgess-Champoux et al., 2008]), followed by quantitative data analysis. After the sixth lesson, students wrote responses to four open-ended questions about consumption and preparation of new whole grain foods, and what they had learned about whole grains and reading food labels followed by qualitative data analysis.

DATA ANALYSIS

The number of *yes/no* pre-and post-survey responses were compared using chi-square tests with $p < 0.05$ indicating statistical significance. Handwritten responses to post-only open-ended questions were typed verbatim into a Qualtrics survey platform. Responses from the first 50 students were read and discussed by two researchers to develop a codebook to define response categories. Codes were assigned to response categories based on similarities of responses. No new response categories were added to the codebook as the last of the 50 student responses were read and discussed. However, any new codes were generated as needed as all remaining responses were coded independently by both researchers. Discussions were held to ensure consensus was reached when differences in coding responses occurred. Responses for each category were counted to report frequencies. Coding categories ranged from 18 to 26 for the four open-ended questions.

RESULTS

SURVEY RESPONSES

Yes/no survey responses were available from 1,748 youth (871 girls and 877 boys) before the program. Youth self-identified as white (69%, n=1,191), American Indian (11%, n=186),

Hispanic (8.3%, n=170), multi-race (8%, n=129), Black (3%, n=56), and other race/ethnicity or no data (0.006%, n=16). For the "I like to try new whole grain foods" statement, 76% indicated *yes* and 24% indicated *no* before the program as compared to 85% indicating *yes* and 15% indicating *no* after the program (n=1,408) ($p < 0.001$). For the "I know how to tell if a food is whole grain" statement, only 38% indicated *yes* while 62% indicated *no* before the program as compared to 80% indicating *yes* and 20% indicating *no* after the program (n=1,412) ($p < 0.001$).

POST-ONLY OPEN-ENDED RESPONSES

For post-only open-ended questions, data were available for 901–1,154 respondents which varied by question. About half of the respondents were boys (50.4%, n=545) or girls (49.6%, n=537), with missing information about sex from 27 students. Respondents were in the third grade (18.6%, n=196), fourth grade (43.5%, n=458), fifth grade (36.3%, n=383), or sixth grade (1.6%, n=17). Information about grade level was missing from 55 respondents.

The four most commonly reported new whole grain foods consumed based on a total of 1,338 responses were whole grain bread/toast (21.2% of responses), hot cereal including oatmeal (17.3%), whole grain pasta (11.3%), and ready to eat cereal (9.7%), followed by brown rice (6.7%), popcorn (6.1%), and pancakes (5.4%). Other foods consumed with a lower frequency included whole grain products such as bars or cookies (3.1%), rice products such as rice pudding or fried rice (3.0%), and crackers (2.7%).

The top two responses regarding what students reported they learned about whole grain foods were "gives you energy" (13.5% of responses) and "should eat more whole grains and exercise" (12.8%) based on responses from a total of 1,127 students. Other common responses were about the various properties of whole grain foods and how to prepare certain whole grain foods such as popcorn; general benefits in terms of performance, sleep, and power; specific benefits for the body (eyes, heart, bones, muscles, digestive system, growth, weight); knowing the three parts of a whole grain; and prevention of chronic disease and conditions such as diabetes, overweight/obesity, and high blood pressure. Responses also included learning about the nutrient content of whole grains (fiber, protein, vitamins, minerals); the importance of eating whole grain food; and the properties of whole grain foods (how to cook, types of whole grains, how to grow, taste).

The most common responses reported regarding which whole grain foods students prepared were bread/toast/biscuits (19.5% of responses), cereal (oatmeal/hot cereal [14.9%]), and whole grain pasta (11.8%) based on a total of 901 responses. Several other common responses were pancakes (6.7%), popcorn (9.3%), and brown rice (4.4%). Students reported preparing foods with various family members including parents, siblings, grandparents, and aunts in dif-

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ferent settings and times, such as in school and at home, for special or routine occasions (watching TV/movies, birthdays, weekends, sleepovers), and for breakfast, lunch, dinner, and snacks.

A total of 1,154 responses were reported regarding how to read food labels, with some students providing more than one answer if they learned multiple concepts surrounding the topic (Table 1). A majority of responses (61.1%) were based on three coding categories: determining if a food is healthy from the label (17.0%), how to read the label to make healthy choices (18.6%), and to read the ingredient list to determine if a product is whole grain (25.5%). Additionally, some students had answers that met the “none/not applicable” category (15.9%). Other common responses were related to awareness of the importance of reading food labels, where to find information on food packages, and looking for certain ingredients such as high fructose corn syrup (HFCS), fat, calories, and protein.

DISCUSSION

The quantitative and qualitative results of this study showed that program learning objectives were met regarding increasing preferences for whole grain foods, expanding the variety of whole grains prepared and consumed, and improving

students’ ability to identify whole grain foods. The survey responses showed improvements among students regarding their enjoyment of trying new whole grain foods and ability to identify whole grain foods. They also provided open-ended responses to questions, which indicated that a variety of whole grain foods were available, prepared, and consumed after the program.

Foods reported as new whole grain foods consumed after the Go Wild with Whole Grains! program were foods such as pancakes and pasta that were commonly served in schools and at home but may not have been served as the whole grain version of the product. Students may have provided these responses based on an increased awareness of the availability of whole grain foods in these settings. Food choice behaviors of children are influenced by parents, peers, and the surrounding environment (Story et al., 2002); therefore, the opportunity to try whole grain foods in the school classroom and cafeteria environments with peers was an important strategy to improve awareness of the availability of whole grain foods.

The most common whole grain foods that students reported preparing during the program were similar to those reported being consumed as new whole grain foods, including bread/toast/biscuits, cereal (oatmeal/hot cereal), and whole grain pasta. The large number and variety of whole grain foods that students listed consuming and preparing was an indication that preferences for whole grain foods increased, which was a central objective of the Go Wild with Whole Grains! program. The proportion of students who indicated they were willing to try new whole grain foods increased from pre- to post-program, which supports the indication that their preferences for whole grain foods also increased. Increasing preferences is especially important, as disliking or not preferring whole grain foods was identified as a primary barrier to intake among children and adolescents (Meynier et al., 2020).

Awareness of the need to change behavior may be an important step in the behavior change process. A review of studies employing the Transtheoretical model to improve dietary intake in adolescents indicated that the model was successful in moving adolescents through the stages of change, the first of which is the precontemplation stage where individuals are unaware of a need to change their diet (Nakabayashi et al., 2020). Therefore, student’s learning regarding the need to eat more whole grains in the current study was positive because this knowledge could lead to changes in intentions and behavior. The program also supported the action stage where students experienced new whole grain foods in school with tasting opportunities and then reported in open-ended responses that they prepared and consumed a wide variety of whole grain foods at home.

The most common open-ended response in the current study regarding increased knowledge surrounding food

Table 1. Topics Reported by Students Related to Reading Food Labels

| Reported Learning Topics | No. | % |
|---|-----|------|
| To read ingredient list to determine if whole grain (whole grain first or second ingredient means it is a whole grain food) | 294 | 25.5 |
| How to read the label to make healthy choices | 215 | 18.6 |
| How to determine if a food is healthy from the label | 196 | 17.0 |
| None or not applicable | 184 | 15.9 |
| Awareness of the general importance of reading food labels, where to find the information on the package | 89 | 7.7 |
| Mentioned other nutrients or ingredients like HFCS, allergens, protein, carbohydrate, fats, calories | 62 | 5.4 |
| To find sugar content | 61 | 5.3 |
| To find fiber content | 21 | 1.8 |
| Specific information about gram quantities (fat, sugar, whole grains) | 13 | 1.1 |
| Labels may not be truthful | 10 | 0.9 |
| To find information about how to prepare the food, recipes | 7 | 0.6 |
| To find serving size | 2 | 0.2 |

labels was an ability to identify whole grain foods, which was consistent with the increased number of youth who reported knowing how to identify a whole grain food from pre- to post-program. A common barrier to eating whole grain foods reported among children and adolescents was difficulty in correctly identifying whole grain foods (Kamar et al., 2019; Meynier et al., 2020). Whole grain products that include 100% whole grains, such as brown rice or oatmeal, can be easily identified. However, many foods currently available in the marketplace contain both whole grain and refined grain ingredients and are more difficult to identify as whole grains. Definitions of whole grain foods may vary by government agency or program (Ferruzzi et al., 2014). Improving the ability of students to identify these products may increase the likelihood that students will meet requirements for intake of whole grain foods. The inability of some students in the current study to identify whole grain foods before the program may have limited their ability to correctly respond to the survey questions; however, students were more likely to accurately report responses to post-program questions based on learning how to identify whole grain foods during the program.

Programs to help students meet requirements for whole grain food intake should first focus on activities that enable identification of whole grain foods, allowing students to intentionally select, prepare, and consume these foods in multiple settings. Because of past confusion around definitions and differences in appearance or color of whole grain foods, these activities may serve as the basis for behavioral change. In addition, awareness of potential health benefits from whole grain food intake should be promoted to motivate students to try new whole grain foods, which could result in improved enjoyment and subsequent behavior change.

CONCLUSION

The results of the current study, which examined responses from students in grades 3–5 to the Go Wild with Whole Grains! Program, indicated that objectives were met regarding increasing preferences for whole grain foods, expanding the variety of whole grains prepared and consumed, and improving students' ability to identify whole grain foods. Food patterns established when individuals are children or adolescents can remain in place as they transition into adulthood (Movassagh et al., 2017); therefore, the positive impacts from the Go Wild with Whole Grains! program for youth may contribute to a greater intake of whole grain foods in later stages of life.

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