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The Tasting Party Assessment 21

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Food neophobia, defined as an unwillingness to consume novel and unfamiliar foods, is common in young children. Assessment of neophobia can be a challenge with this audience. With the increase in nutrition interventions focused on the young child, valid and reliable measures to assess willingness to try new foods that can be administered in groups by classroom teachers and Extension educators are needed. The Food Friends: Fun with New Foods (FWNF) program aims to increase children's willingness to try new foods in childcare settings. The Tasting Party assessment was developed as the primary tool for measuring the FWNF program's impact. Construct and face validity were established, and inter-observer reliability between two researchers and teachers was obtained. Findings indicated the Tasting Party could reliably be used by classroom teachers to accurately observe tasting behaviors in a group of preschool-aged children. The Tasting Party provides a low-cost, low-burden valid and reliable assessment tool, thus, enhancing the scalability and reach of nutrition education programs focused on young children. The Tasting Party is adaptable for use in Extension programs such as the Expanded Food and Nutrition Education Program (EFNEP) and Supplemental Nutrition Assistance Program Education (SNAP-Ed).

Keywords: Preschool, childcare, nutrition, teachers, evaluation, food neophobia, picky eating, assessment

Introduction

Children develop eating patterns and preferences for foods early in life. Thus, the preschool years are a critical time for the development of healthful behaviors (Ventura & Worobey, 2013). With 58% of preschool-aged children attending childcare centers in the U.S. (U.S. Department of Education. Institute of Education Sciences [IES], 2017), preschools are viewed as an ideal environment to influence the development of young children's healthful eating behaviors, such as trying new foods (Niemeier et al., 2010).

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Journal of Human Sciences and Extension Volume 9, Number 1, 2021

Trying new foods can be difficult for children. Food neophobia, defined as an unwillingness to consume novel and unfamiliar foods, is common in young children (Galloway et al., 2003). Neophobic children may have poorer and less nutrient-dense diets than their non-neophobic peers. Increased opportunities to experience and become more familiar with a new food can increase a child's familiarity with that food and their willingness to try other new foods in the future (Ahern et al., 2013; Maier-Noth et al., 2016).

Unwillingness to try new foods (food neophobia) is one characteristic of picky eating. Picky eaters also reject foods based on sensory characteristics (e.g., aroma, smell, texture) and limit the type and amount of foods they eat. (Johnson et al., 2018). In early childhood, unfamiliarity with foods and sensory characteristics due to limited exposures can lead to children's unwillingness to try new foods.

With up to 60% of preschool-aged children displaying some degree of picky eating or food neophobia, providing opportunities for children to learn about and try new foods is a recommended nutrition education strategy (Institute of Medicine [IOM], 2011). However, assessing young children's willingness to try new foods, or food neophobia, can be challenging due to their brief attention span and limited cognitive, verbal, and social skills (Wiseman & Harris, 2015). Traditionally, evaluation measures for food neophobia have been conducted via proxy reports by caregivers – parents and childcare providers – or one-on-one tasting assessments with children (Birch & Sullivan, 1991; Damsbo-Svendsen et al., 2017). These assessments, often used in research studies and conducted by trained research staff, can be resource-intensive and cost-prohibitive for large-scale program dissemination (Austin & Novak, 1976). Further, for interventions delivered in a group setting, like many that target low-income families in Extension programs such as the Expanded Food and Nutrition Education Program (EFNEP) and Supplemental Nutrition Assistance Program Education (SNAP-Ed), individual tasting assessments are not plausible for educators to conduct due to the time and resource commitment needed. With the recent rapid rise of nutrition interventions focused on early care environments, the need for valid and reliable assessments that can be conducted by teachers and Extension educators in group settings is high (Roofe & Bihm, 2013).

Evaluation of nutrition interventions is integral to understanding both impact and effectiveness. Evaluation examines Extension programs and informs decisions about whether to continue, expand or improve interventions, deliver them to new audiences, or shift resources to other programming areas (Braverman, 2020). Ineffective interventions can cost substantial amounts of money that could be directed to more effective programs (Peersman & Rugg, 2004). Thus, programs delivered, either directly or indirectly, by Extension educators warrant strong assessment tools to support program resources and justify the allocation of resources to local, state, and federal stakeholders.

The Food Friends: Fun with New Foods® (FWNF) program is a research-based intervention designed to increase children's willingness to try new foods in the preschool setting. The FWNF classroom program is a 12-week intervention that includes a 15 to 20-minute nutrition activity 1x/week and opportunities to try new foods 2x/week (Young et al., 2003; 2004). Various tactics bring the Food Friends to life in a playful and exciting manner. Child-centered activities and supporting materials were developed for eight food characters and 13 novel foods (Young et al., 2003; 2004). The eight Food Friends characters, such as Corrine Carrot® and Tina Tortilla®, are central to program themes and materials and help create a positive emotional valence, or 'goodness' about trying new foods, while also encouraging positive social interactions around food. The efficacy of the FWNF program was demonstrated originally using the well-documented researcher administered Tasting Panel assessment by Birch and Sullivan (1991; Johnson et al., 2007).

Therefore, the purpose of the study was to develop a tasting assessment to be used in the preschool setting. To allow for expanded implementation of the FWNF program, a Tasting Party assessment was developed to meet the needs of a larger scale program evaluation that could be conducted with groups of children in preschools. Using Sullivan's tasting panel as the framework, the Tasting Party assessment was developed to be used as the primary tool which would enable teachers to measure the FWNF program's impact on children's willingness to try new foods (Birch & Sullivan, 1991).

Purpose

The purpose of this research was to a) test the reliability of the Tasting Party in measuring preschool children's willingness to try new foods when implemented by classroom teachers (Psychometric Testing) and b) report multiple years of statewide implementation data on the FWNF program, which was assessed by the Tasting Party (Program Dissemination).

Methods

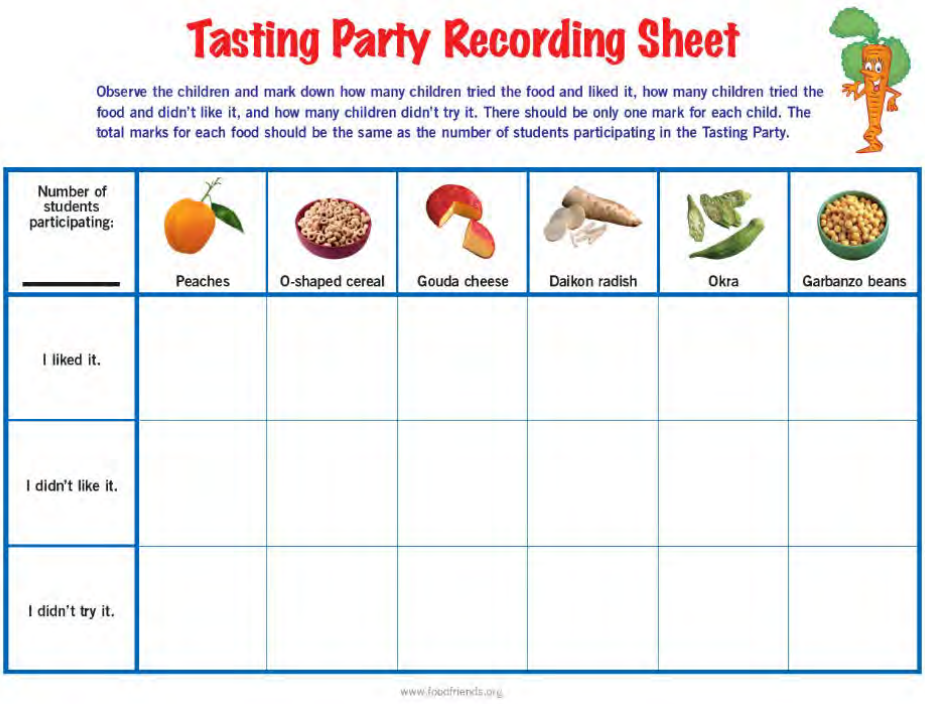
Implementation of the Tasting Party included two key components to be performed by two members of the teaching staff: a) the food introduction component and b) the data collection component. During the food introduction component, one teacher was asked to introduce and serve each food one-by-one in a fun party-like environment, inviting the children to taste the food. Teachers also served themselves the same foods, in the same order, and modeled tasting for the children. As one teacher served the food to the children, another teacher was responsible for the data collection component where they observed and recorded whether each child tried the food and then recorded the child's affective rating (tried and liked, tried and didn't like, didn't try). Procedures for psychometric testing and program dissemination were approved by the Institutional Review Board at Colorado State University.

Tasting Party Assessment

The Tasting Party was designed to introduce six foods: two familiar foods (peaches and O-shaped cereal/Cheerios®), two FWNF program foods that were offered repeatedly through FWNF (Gouda cheese and daikon radish), and two novel foods (okra and garbanzo beans) to the preschoolers. It was rationalized that: a) the two familiar foods would be eaten by the majority of children, thus establishing a baseline, b) the rate at which program foods were sampled would reflect the impact of the intervention, and c) the rate at which novel foods were sampled would demonstrate the generalizability of the program on children's willingness to try to other novel foods.

Foods included in the program and Tasting Party assessment were deemed to be novel to the majority of preschoolers in Colorado via previous research (Young et al., 2004). Responses to children's willingness to try the six foods were counted and tallied as a) "tried and liked" the food offered, b) "tried and disliked" the food offered, or c) "didn't try" the food offered (Figure 1). "Tried" was defined as the child swallowing the food. "Tried and liked" and "tried and disliked" categories were collapsed into a "tried" category.

Figure 1. Tasting Party Recording Sheet


Tasting Party Recording Sheet

Observe the children and mark down how many children tried the food and liked it, how many children tried the food and didn't like it, and how many children didn't try it. There should be only one mark for each child. The total marks for each food should be the same as the number of students participating in the Tasting Party.

Number of students participating: _____	Peaches	O-shaped cereal	Gouda cheese	Daikon radish	Okra	Garbanzo beans
I liked it.						
I didn't like it.						
I didn't try it.						

www.foodfriends.org

To ensure its versatility, the Tasting Party was built into the FWNF program as an activity implemented during week 0 (pre-test) and week 12 (post-test). Teacher input was incorporated into development to ensure that they could easily perform the activity in the classroom, including

being able to a) implement the activity and assessment during existing snack-times, b) evaluate multiple children in a group setting, c) complete the assessment in 20 minutes or less, and d) make sure that the assessment required little training.

Classroom Implementation of the Tasting Party

Prior to program implementation, teachers attended a two-hour training session conducted by Extension, SNAP-Ed, or university program staff on the FWNF program during which the implementation of the Tasting Party was briefly covered (10 minutes). Included in the Teacher's Guide for the FWNF program were instructions on how to execute the Tasting Party: preparation of food to be tasted, information on positive/neutral modeling of eating behaviors by teachers, instructions on how to introduce the foods to the children, and how to record results accurately.

Psychometric Testing

Construct validity was established for the Tasting Party through panel review by experts in the fields of nutrition, child feeding, and early childhood, while face validity was established with preschool teachers. To ascertain whether teachers could accurately assess children's willingness to try new foods, a convenience sample of 9 Head Start classrooms was recruited to test the reliability of the Tasting Party assessment at both pre- and post-intervention. In each of the classrooms, two researchers individually observed and recorded the children's willingness to try the foods presented. The teacher was asked to independently observe and record the children's behaviors. Children with known food allergies (e.g., dairy, wheat) were not served that food. Data collected by researchers were combined and compared against data collected by the teacher to determine interobserver reliability (IOR).

Program Dissemination

Between 2009-2013, the FWNF program was disseminated to 200 preschool centers statewide, reaching 50,924 children in 941 classrooms (Anderson, 2013). During the training and again at the end of program implementation, teachers were encouraged to complete the Tasting Party with their students. Centers were mailed the Tasting Party recording sheet along with an FWNF Teacher Survey for each participating classroom. The FWNF Teacher Survey consisted of 11 questions seeking input on teachers' favorite/least preferred program activities and their perceptions of children's interest in each of the 25 FWNF activities, including the Tasting Party (Likert-type scale with 5 = *High Interest* and 1 = *Low Interest*). Teachers also indicated whether they 'Did not do' the activity with the class.

Data Analysis

To test for IOR, observational data were collapsed into two categories to ascertain trying: tried (scored as "1") and did not try (scored as "0"). The IOR was assessed by agreements (A) over

agreements plus disagreements (A + D) and multiplied by 100. Research suggests that satisfactory IOR needs to be at 85% or greater percent agreement for a tool to be considered a reliable data-gathering instrument (Baglio et al., 2004; Simons-Morton & Baranowski, 1991). Data collected at pre-test and post-test Tasting Parties were analyzed with a mixed model ANOVA to determine any significant differences among observers in ratings of children's willingness to try Tasting Party foods. Additional predictors for the class effects and time effects (weeks) were added to the model. Due to the challenges in observing the eating behaviors of all children in large classes, missing data were not considered, and there were uneven sample sizes for different foods. Missing data per food did not exceed five children per food or 4%, which is well within acceptable ranges of 15-20% (Dong & Peng, 2013).

All psychometric testing data were analyzed using SAS for Windows version 9.1 (SAS Institute Inc., Cary, N.C.). Implementation data was inputted into an Excel (Microsoft 2013) spreadsheet where descriptive statistics were calculated. For the Tasting Party data, the percent of children who tried each food was calculated, and the mean for the two foods making up the 'familiar foods,' 'program foods,' and 'novel foods' categories were reported.

Results

Psychometric Testing

A total of 116 children were observed during the pre-test (Week 0), and 113 children were observed during the post-test (Week 12) evaluation. On average, 12 children were observed per classroom (n = 9) for both the pre-test and post-test. Individual demographics for the children were not collected; however, participating preschools served approximately 50% Hispanic and 50% white, non-Hispanic children. A large majority of children came from families with limited resources, as evidenced by their participation in Head Start centers.

The IOR for teachers versus researchers was determined for each food and total foods observed in the pre- and post-Tasting Party. The IOR was strong between researchers and the teachers during both pre-test and post-test Tasting Party for each of the six foods and all the foods cumulatively (Table 1). A significant observer effect for okra $F(1,17) = 4.57$, $p = 0.048$ was noted, suggesting a discrepancy in observer interpretation of preschool behaviors towards okra during both the pre- and post-test evaluation. Teachers more frequently observed children trying okra than did the researchers. No other significant observer effects were found.

Similarly, no effects were identified for individual classes or time points on child willingness to try the foods. The within-subjects independent time effect (pre- and post-tests of child willingness to try Tasting Party foods) was not found to significantly alter child willingness to try foods. That is to say, children were not more likely over time to try foods, and different classes were not more likely than others to try foods.

The Tasting Party Assessment 27

Table 1. Reliability of Classroom Teachers vs. Research Staff to Assess Preschool Children's Willingness to Try New Foods

	Pre-test			Post-test		
Food	n	A/(A+D)*	% Agreement**	n	A/(A+D)*	% Agreement**
Peaches	115	113/115	98	113	110/113	97
O-shaped Cereal	116	112/116	97	113	111/113	98
Gouda Cheese	111	106/111	95	112	108/112	96
Daikon Radish	115	102/115	89	111	106/111	95
Okra	115	93/115	81	111	99/111	89
Garbanzo Beans	116	109/116	94	111	104/111	93
Total	688	635/688	92	671	638/671	95

* Determined by agreements (A) divided by agreements plus disagreements (A+D)
** Inter-Observer Reliability is expressed as a percent agreement.

Program Dissemination

Over four years, Tasting Party data were collected on 14,343 children. The vast majority (96.8%) of children tried familiar foods (peaches and O-shaped cereal) and program foods (92.5% tried Gouda cheese and Daikon radish); however, fewer children tried novel foods (78.2% tried garbanzo beans and okra). Teachers who completed the FWNF Teacher Survey from 2009-2013 (N = 684) ranked the children's interest in FWNF activities between 3.4–4.5 (5 = High Interest). The Tasting Party, conducted by 612 respondents (89.5%), was the second highest-ranking activity (4.4) behind the introductory puppet show (4.5; details on other FWNF activities can be found in Johnson et al., 2019). Many teachers listed the Tasting Party as their favorite activity: "The food Tasting Party [was the students' favorite] because it engaged awesome conversation among the kids at the table," and "The Tasting Party was great! They loved it. The ones who did not want it [the foods] earlier tried it at the end."

Discussion

The Food Friends' Tasting Party was designed as the primary assessment tool for the FWNF program to evaluate children's willingness to try program and novel foods. The current study found that the Tasting Party could reliably be used by classroom teachers to accurately observe tasting behaviors in a group of up to 15 preschool-aged children. Further, the Tasting Party was deemed a highly popular activity amongst both teachers and preschoolers. This fills a gap in the literature as no reliable observer tool has been documented to measure tasting behaviors in a group setting with young children ages 3-5 years of age (Damsbo-Svendsen et al., 2017). Coupled with nutrition education programming, the Tasting Party offers an assessment tool to

Journal of Human Sciences and Extension Volume 9, Number 1, 2021

capture program outcomes related to trying new foods, thus, providing objective data to support program effectiveness.

This tool could be of practical use for Extension staff. As noted by Lanigan and Power (2008), Extension educators expressed a willingness to do more related to obesity prevention (i.e., healthy eating activities) if barriers such as a lack of time and resources and other curriculum demands could be alleviated. Extension educators might train classroom educators to use this assessment and, as such, can expand their role in professional development for preschool teachers and program evaluation (Durden et al., 2013; Lanigan & Power, 2008). Further, the Tasting Party could be used with paraprofessionals as part of EFNEP or SNAP-Ed activities.

With the increase and focus on nutrition and food interventions in childcare, several approaches to assessing food preferences have been reported. Recent studies have found that using pictures or questionnaires to assess food preferences and food choices amongst children of various ages are valid when compared to observed behaviors (Jaramillo et al., 2006; Olsen et al., 2012; Wiseman et al., 2017).

Concerns exist, however, regarding social desirability, including caregivers reporting differences in children's stated willingness compared to observed behaviors (Rioux et al., 2016; Rubio et al.,2008). Further, these assessments focus on behavioral intent (likelihood of trying a food) and not actual behavior.

The Tasting Party assessment presented in this study is an effort to capture children's observed willingness to try new foods versus children's reports of what they might be willing to try. The Tasting Party approach aligns with the assessment of Birch et al. (1987) and colleagues who developed the Tasting Panel used with individual children because of differences in food ratings when children examined a picture compared to tasting the food. More recently, a review of instruments to assess food neophobia in children noted that behavioral assessments with actual foods may be more reliable than pictures to assess food-related behaviors and that a taste-testing session with subsequent questions asked of children is a recommended behavioral approach to capture willingness to try new foods (Damsbo-Svendsen et al., 2017).

Taste-testing measures in elementary children have been previously tested, but not for preschool-aged children (Baglio et al., 2004; Damsbo-Svendsen et al., 2017; Kaiser et al., 2012; Martin et al., 2010; Simons-Morton et al., 1992). Kaiser and colleagues developed and psychometrically tested a taste test tool for schoolchildren aged eight and older (2012). Findings from this study demonstrated that a teacher-administered assessment is feasible to conduct in a group setting and produced valid and reliable data. Further, it was noted that the administrative burden of using a group-based assessment is reduced compared to one-on-one interviews often used in research projects (Kaiser et al., 2012). Due to the developmental and cognitive differences between school-age children and preschoolers, a tool to assess willingness to try new foods specific for young children was needed. The development of the Tasting Party allows for research-based

nutrition interventions to be scaled up to community-wide dissemination with fewer resources required.

The Tasting Party provides teachers and Extension educators with an objective and reliable evaluation tool to assess willingness to try new foods, contributing to the scalability and reach of the FWNF program. Scalability and reach considerations can allow small-scale interventions to be efficaciously expanded to larger groups in real-world contexts (Milat et al., 2013). This is of particular importance and value for Extension-based interventions as programs with limited resources can reach greater numbers of people without greatly increasing financial costs, time resources, or other means (Huang et al., 2011; Milat et al., 2013). The ability of the FWNF program to span larger groups of youth increases the reach, scope, and level of effectiveness of the intervention.

Strengths and Limitations

One strength of the Tasting Party is its simplicity. Teachers, as observers in the Tasting Party, do not need to quantify or classify foods eaten, only that a food was tried and liked, tried and disliked, or not tried at all. This simplified process allows for a quick and accurate notation of information from teachers, expanding the number of children able that can be observed by one observer and eliminating the need for lengthy trainings and the high cost of researchers as observers. This simplification, however, is also a limitation. The type of data collected is limited to only whether the child tried a food and whether the child liked or disliked it. Other limitations include that the group approach may introduce peer influence and lead to bias in responses. This limitation can be controlled by training teachers to encourage children to wait to provide their response after their tasting experience until all children have had an opportunity to try the food. Further, the ability to assess willingness to taste foods is limited to the specific foods included in the Tasting Party. Lastly, response bias may have occurred with only teachers who completed most activities and/or who had positive views of the program returning the FWNF Teacher Survey and/or Tasting Party.

Conclusions

Research related to FWNF highlights that experiential preschool nutrition education programs that focus on positive repeated exposure to new foods yield improvements in children's eating behavior during preschool and into early elementary school (Johnson et al., 2007; Johnson et al., 2019). As research-based programs begin to scale up in dissemination reach, it is critical to continue to assess the program's effectiveness (Milat et al., 2013). An evaluation tool in which teachers and Extension educators can objectively and reliably assess the target behavior, such as children's willingness to try new foods, enhances the scalability and reach of such programs.

The Tasting Party observer tool provides a valuable resource for future evaluation and research, nutrition programming for young children, and the practice of classroom-based health education.

With this tool, young children's tasting behaviors can be easily collected in group-settings by utilizing teachers or Extension educators as observers in the classroom with minimal resources (training and time) required. While the Tasting Party directly benefited the FWNF program, the flexible structure of the Tasting Party allows researchers and practitioners to switch out foods with other foods that may be more pertinent to their research question or program. This tool can be administered in SNAP-ED, EFNEP, and other Extension nutrition programming to capture program outcomes related to food behaviors. Extension educators and teachers can use this information to justify programming efforts, demonstrate meeting education/program standards, and provide evidence of program impact for allocation of resources.

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Journal of Human Sciences and Extension Volume 9, Number 1, 2021

The Tasting Party Assessment 32

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Journal of Human Sciences and Extension Volume 9, Number 1, 2021

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