Creating a Valid and Reliable Consumer Food Safety Tool

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Objectives

- Review how the Theory of Planned Behavior was used to create Kitchen Kaizen, a hands-on consumer food safety workshop
- To understand the process of creating an evaluation instrument
- Identify the benefits of using a factor analysis to help validate a program evaluation tool

Introduction

General background

- COVID-19 has led to increased attention and focus on food safety.
- Every year, about 17% of the U.S. population experience a foodborne illness.[1]
- Research shows this is because people do not understand or know proper food handling practices to prevent disease transmission.[2]
- To help increase this knowledge and prevent foodborne illness, a hands-on, theoretically driven program was created.

Evaluation Tool

- Surveys are a familiar evaluation tool to assess consumers in food safety studies and interventions.[3]

Stepwise Validation of Tool

- The authors used the following sequences for tool testing and validation: Questionnaire Conceptualization, Format and Data analysis, Establishing Validity and Establishing Reliability.[4]
- To establish reliability, factor analysis and Cronbach's alpha were used.
- A factor analysis is common among exploratory research, using a mathematical process applied to Likert-scale survey items, to identify and eliminate redundant items.[7]
- Santos and Clegg (1999) encourage applying factor analysis as part of Extension Likert surveys, as a way to strengthen program evaluation.[4]
- Consumer food safety evaluations lack this process towards instrument validity, often relying on observation and/or face, content, construct, etc. validity.[5,6]
- Using a factor analysis to create a valid and reliable survey within a consumer food safety context is limited, but has been recently applied to animal contact risks and the Expanded Food and Nutrition Education Program.[7,8]

Method-Factor Analysis

- A pretest of Kitchen Kaizen was completed to determine program efficacy. Draft surveys were used to assess outcomes.
- Using factor analysis, questions were eliminated that did not collectively contribute to explaining program results
- The updated tool was used in the full pilot. The updated tool was reanalyzed using both factor analysis and Cronbach's alpha. The goal was to have all loadings 0.5 or greater and achieve an overall Cronbach's alpha of 0.7.

Results

ORIGINAL SURVEY	Factor/Component					
	1	2	3	4	5	6
(intention) Prepare food safely for myself and others	.236	-.133	.143	-.081	.562	-.643
(intention) Calibrate my food thermometer	.383	.416	.657	-.161	-.153	-.111
(intention) Make my own sanitizer	.364	.670	.229	-.151	.117	.111
(intention) Wash raw poultry	-.157	.618	-.035	.546	-.136	.150
(intention) Check my refrigerator temperature	.566	.044	.569	.221	.198	.202
(intention) Wash produce with potable water	.347	-.124	.688	.410	-.131	.040
(skills/knowledge). Prepare food safely	.653	-.247	-.144	.370	.082	-.122
(skills/knowledge). Calibrate my food thermometer is	.553	.515	-.213	-.124	-.087	-.330
(skills/knowledge) Make my own sanitizer	.424	.687	-.263	-.029	.268	.116
(skills/knowledge) Wash raw poultry is	-.300	.521	-.402	.346	.173	.126
(skills/knowledge) Check my refrigerator temperature is	.667	.053	-.225	.219	.402	.055
(skills/knowledge) Wash produce with potable water	.638	-.330	-.052	.355	.075	-.079
(confidence) Prepare food safely for myself and others	.579	-.125	-.333	.085	-.445	-.267
(confidence) Calibrate my food thermometer	.715	.221	-.059	-.296	-.366	-.058
(confidence) Make my own sanitizer	.762	.230	-.037	-.388	-.020	.063
(confidence) Not wash raw poultry	.358	-.485	-.033	-.397	.239	.372
(confidence) Check my refrigerator temperature	.763	-.221	-.174	-.150	.035	.372
(confidence) Wash produce with potable water	.791	-.325	-.179	.304	-.207	.056

FINAL SURVEY	Factor/Component			
	1	2	3	4
Q5-knowledge/skills prepare food safely	.766			
Q8- knowledge/skills to check refrigerator thermometer	.627			
Q9- knowledge/skills wash produce with potable water	.841			
Q12- confidence to wash produce with potable water	.791			
Q1- intention to make sanitizer		.675		
Q6- skills/knowledge calibrate thermometer food thermometer		.801		
Q10- confidence to calibrate food thermometer		.765		
Q11- confidence to make sanitizer		.780		
Q3- intention to check thermometer of refrigerator			.768	
Q4- intention to wash poultry			.813	
Q7- wash raw poultry (undesirable action)				.814
Q2- intention to wash meat (undesirable action)				.876

Interpretation and Next Steps

The testing of the survey happened in stages. Using the steps outline in the following were found:

- Through Exploratory Factor analysis, the pretest suggested the survey could be shortened from 15 questions to 12 question. Further, multiple questions were found to "load" on more than 1 factor. The goal is to have them load on one factor.
- During the pilot test, the shortened survey was test. The results show the questions loaded on one survey and had strength in explaining the outcome.
- There were four dimensions in the survey that worked together to explain the outcomes.
- Cronbach's alpha was over 0.76 which shows there is internal reliability with the survey

Next Steps

- The survey was found to hold up in the full pilot.
- To verify it works in multiple populations, targeted testing with minority populations needs to occur.
- The tool needs to be translated into other languages to verify it works with those for whom English is not their first language.
- Factor analysis and Cronbach's alpha offers a tool for educators to validate their survey is works and tells the story of their program. Other educators should explore its use moving forward.

References

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