The Effect of Free Nutritious Meals Program Implementation on Changes in Students' Consumption Behavior

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Abstract
This study examines how the Free Nutritious Meals Program shapes students' consumption behavior in East Priangan through dimensional and overall program effects. A quantitative causal design was employed using survey data from 140 junior and senior secondary school students. Data were collected through a five-point Likert-scale questionnaire and analyzed using Partial Least Squares Structural Equation Modeling through a two-stage hierarchical approach. Four of nine dimensional hypotheses were supported. Program Exposure significantly influenced Healthy Food Preference and Changes in Consumption Habits, while Program Quality significantly influenced Healthy Food Preference and Nutritious Food Consumption Frequency. Program Accessibility showed no significant effects on the three dimensions of students' consumption behavior. At the higher-order level, the Free Nutritious Meals Program strongly and positively influenced Change in Students' Consumption Behavior, with a path coefficient of 0.838, and explained 70.2 percent of its variance. This study extends school feeding program evaluation beyond nutritional outcomes by integrating program implementation dimensions with a consumer behavior perspective and showing that the program operates more strongly as an integrated multidimensional intervention than through its individual dimensions.

Keywords: Free Nutritious Meals Program; Program Exposure; Program Quality; Students' Consumption Behavior; School Feeding Policy

1. Introduction

The Free Nutritious Meals Program (*Program Makan Bergizi Gratis*) represents a school food policy designed not only to improve students' nutritional intake but also to encourage healthier consumption habits. Globally, school feeding programs have been used as strategic interventions to improve diet quality, health, and students' food environments (Food and Agriculture Organization, 2022; World Food Programme, 2023; World Health Organization, 2021). In Indonesia, the implementation of MBG therefore warrants examination beyond nutritional adequacy alone (Octawijaya et al., 2023). Therefore, this study examines whether regular exposure to nutritious meals through the program influences students' food preferences, consumption habits, and nutritious food consumption patterns.

Previous studies indicate that school-based food interventions can improve diet quality and encourage healthier food choices.Capper et al. (2022) highlight the school environment as an important setting for shaping eating behavior, while Teo et al. (2021) and Durão et al. (2024) show that structured provision of healthy food can influence consumption patterns through repeated

experience and exposure. However, much of the existing literature has focused primarily on nutritional and health outcomes. Comparatively less attention has been given to how the implementation of school feeding programs including students' exposure to the program, perceived program quality, and accessibility may shape healthy food preferences, established consumption habits, and the frequency of nutritious food consumption.

From a theoretical perspective, changes in consumption behavior can be explained through behavioral change and consumer behavior approaches, which emphasize environmental stimuli, consumption experience, and adaptation processes in the formation of new habits (Albarracín et al., 2024; Fatemi et al., 2025; Ran et al., 2024). In this study, the implementation of the MBG Program is positioned as a policy stimulus represented by Program Exposure, Program Quality, and Program Accessibility. Change in Students' Consumption Behavior is represented by Healthy Food Preference, Changes in Consumption Habits, and Nutritious Food Consumption Frequency. This framework allows program evaluation to move beyond the mere provision of meals and to examine how the program is experienced and translated into students' consumption behavior.

A key research gap lies in the limited number of studies that integrate school food policy implementation with a consumer behavior perspective using a higher-order structural model. Existing studies have largely examined nutritional outcomes or isolated aspects of school food interventions, leaving insufficient evidence on whether different dimensions of program implementation exert similar or differentiated effects on students' consumption behavior. This study addresses that gap by examining the effects of Program Exposure, Program Quality, and Program Accessibility on three behavioral dimensions at Stage 1, followed by an assessment of the overall effect of the MBG Program on Change in Students' Consumption Behavior at Stage 2. The novelty of the study therefore lies in combining dimensional analysis with a higher-order evaluation of the program, allowing the research to identify not only whether MBG influences consumption behavior, but also which implementation dimensions play more prominent roles.

Accordingly, this study aims to analyze the effect of the Free Nutritious Meals Program on changes in students' consumption behavior in East Priangan. Specifically, it examines the effects of Program Exposure, Program Quality, and Program Accessibility on Healthy Food Preference, Changes in Consumption Habits, and Nutritious Food Consumption Frequency, and subsequently evaluates the overall effect of the MBG Program on Change in Students' Consumption Behavior. The findings are expected to contribute empirical evidence to behavior-based evaluation of school food policy and to provide a basis for improving the implementation of the MBG Program more effectively.

2. Research Method

This study employed a quantitative causal design using a survey method to examine the effect of the Free Nutritious Meals Program (*Program Makan Bergizi Gratis*) on changes in

students' consumption behavior. The study involved junior and senior secondary school students (SMP/MTs and SMA/SMK/MA) who had received the MBG Program in East Priangan. A total of 140 respondents were selected using purposive sampling based on the criteria that they had received the MBG Program and were willing to participate in the study. Primary data were collected through a structured questionnaire using a five-point Likert scale. The MBG Program was operationalized through three first-order dimensions Program Exposure, Program Quality, and Program Accessibility while Change in Students' Consumption Behavior was represented by Healthy Food Preference, Changes in Consumption Habits, and Nutritious Food Consumption Frequency.

Data were analyzed using Partial Least Squares–Structural Equation Modeling (PLS-SEM) through a two-stage hierarchical approach (Hair et al., 2021). In Stage 1, the first-order measurement model was evaluated using outer loadings, Cronbach's Alpha, Composite Reliability, Average Variance Extracted (AVE), and discriminant validity (Fornell & Larcker, 1981; Hair et al., 2021). The dimensional structural relationships linking Program Exposure, Program Quality, and Program Accessibility to Healthy Food Preference, Changes in Consumption Habits, and Nutritious Food Consumption Frequency were subsequently tested using bootstrapping. Structural relationships were evaluated using standardized path coefficients, t-statistics, and p-values. Relationships were considered statistically significant when the t-statistic exceeded 1.96 and the p-value was below 0.05 (Hair et al., 2021).

In Stage 2, latent variable scores obtained from the first-order constructs were used to estimate the higher-order constructs of MBG Program and Change in Students' Consumption Behavior (Hair et al., 2021). The higher-order measurement model was evaluated through dimension loadings, Cronbach's Alpha, Composite Reliability, and AVE. The structural model was then assessed using the Inner Variance Inflation Factor (VIF), standardized path coefficient, t-statistic, p-value, 95% confidence interval, and effect size (f^2). Model explanatory power was assessed using the coefficient of determination (R^2), while model fit was examined using the Standardized Root Mean Square Residual (SRMR). Predictive relevance and out-of-sample predictive performance were further evaluated using Q^2predict and PLSpredict by comparing the prediction errors of the PLS-SEM model with those of a linear model benchmark. This two-stage procedure enabled the study to distinguish dimensional relationships at the first-order level from the integrated relationship between the MBG Program and Change in Students' Consumption Behavior at the higher-order level.

3. Results and Discussions

Respondent Characteristics

The study involved 140 students who met the research criteria. Respondent characteristics were described based on gender, educational level, age, and district or city of origin, as presented in Table 1.

Table 1. Respondent Characteristics

Characteristics	Category	Frequency (n)	Percentage (%)
Gender	Female	97	69.3
	Male	43	30.7
Educational level	Senior High School/Vocational High School/Islamic Senior High School	102	72.9
	Junior High School/Islamic Junior High School	38	27.1
Age	12–13 years	14	10.0
	14–15 years	26	18.6
	16–17 years	77	55.0
	18–19 years	23	16.4
District/City of origin	Tasikmalaya Regency	98	70.0
	Garut Regency	21	15.0
	Ciamis Regency	14	10.0
	Tasikmalaya City	5	3.6
	Banjar City	1	0.7
	Pangandaran Regency	1	0.7

Source: processed data

Respondents were predominantly female (69.3%) and mainly enrolled at the senior high school, vocational high school, or Islamic senior high school level (72.9%). The largest age group was 16–17 years (55.0%). In terms of geographical distribution, most respondents came from Tasikmalaya Regency (70.0%), followed by Garut Regency (15.0%) and Ciamis Regency (10.0%).

PLS-SEM Analysis

The Partial Least Squares–Structural Equation Modeling (PLS-SEM) analysis was conducted using a two-stage hierarchical approach because the MBG Program and Change in Students' Consumption Behavior were specified as higher-order constructs. Stage 1 evaluated the first-order measurement model and the dimensional structural relationships among Program Exposure, Program Quality, Program Accessibility, Healthy Food Preference, Changes in Consumption Habits, and Nutritious Food Consumption Frequency. Stage 2 assessed the higher-order measurement model and the structural relationship between the MBG Program and Change in Students' Consumption Behavior.

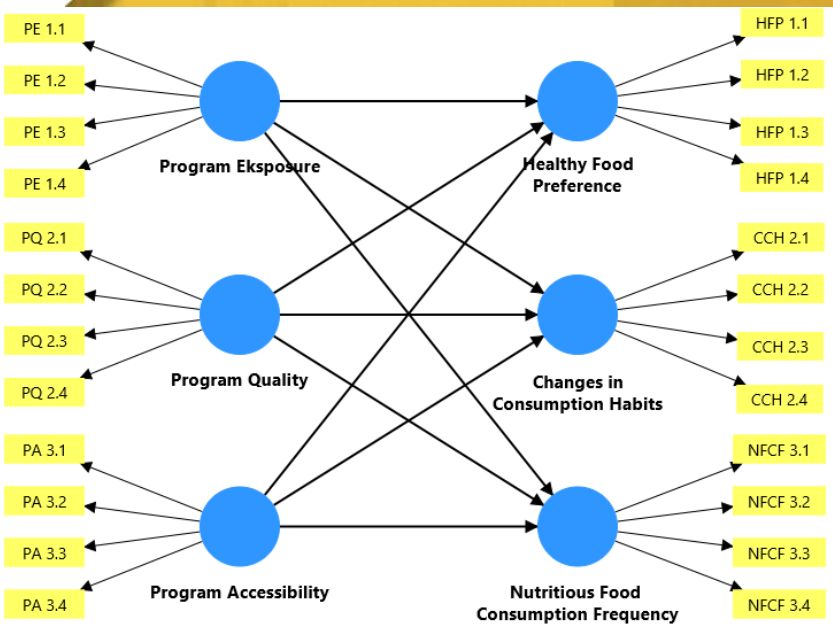

Figure 1. First-Order Measurement Model (Stage 1)

Measurement Model Analysis – Stage 1

The Stage 1 measurement model was evaluated using outer loadings, internal consistency reliability, and convergent validity. Indicator loadings above 0.70, reliability values above 0.70, and AVE values above 0.50 were considered satisfactory (Hair et al., 2022).

Table 2. Validity and Reliability Assessment – Stage 1

Construct	Indicator	Outer Loading	Cronbach's Alpha	Composite Reliability	AVE
Changes in Consumption Habits	CCH2.1	0.862	0.880	0.917	0.735
	CCH2.2	0.866			
	CCH2.3	0.852			
	CCH2.4	0.849			
Healthy Food Preference	HFP1.1	0.852	0.868	0.910	0.718
	HFP1.2	0.905			
	HFP1.3	0.813			
	HFP1.4	0.815			
Nutritious Food Consumption Frequency	NFCF3.1	0.716	0.878	0.918	0.739
	NFCF3.2	0.910			
	NFCF3.3	0.883			
	NFCF3.4	0.912			

Construct	Indicator	Outer Loading	Cronbach's Alpha	Composite Reliability	AVE
Program Accessibility	PA3.1	0.796	0.869	0.911	0.719
	PA3.2	0.889			
	PA3.3	0.906			
	PA3.4	0.794			
Program Exposure	PE1.1	0.843	0.847	0.897	0.687
	PE1.2	0.848			
	PE1.3	0.855			
	PE1.4	0.764			
Program Quality	PQ2.1	0.831	0.890	0.924	0.753
	PQ2.2	0.864			
	PQ2.3	0.875			
	PQ2.4	0.899			

Source: processed data

All indicators exhibited outer loadings above 0.70, ranging from 0.716 to 0.912. Cronbach's Alpha and Composite Reliability values exceeded 0.70, while AVE values ranged from 0.687 to 0.753. These results indicate satisfactory internal consistency reliability and convergent validity across all first-order constructs.

Discriminant Validity – Stage 1

Discriminant validity was assessed using the Fornell–Larcker criterion by comparing the square root of each construct's AVE with its correlations with other constructs. Discriminant validity is generally established when the square root of AVE exceeds the corresponding inter-construct correlations (Fornell & Larcker, 1981). The results are presented in Table 3.

Table 3. Fornell–Larcker Criterion – Stage 1

Construct	CCH	HFP	NFCF	PA	PE	PQ
Changes in Consumption Habits (CCH)	0.857					
Healthy Food Preference (HFP)	0.825	0.847				
Nutritious Food Consumption Frequency (NFCF)	0.754	0.723	0.859			
Program Accessibility (PA)	0.708	0.692	0.683	0.848		
Program Exposure (PE)	0.757	0.747	0.703	0.812	0.829	
Program Quality (PQ)	0.701	0.737	0.778	0.811	0.843	0.868

Note: Diagonal values (bold) represent the square root of AVE. CCH = Changes in Consumption Habits; HFP = Healthy Food Preference; NFCF = Nutritious Food Consumption Frequency; PA = Program Accessibility; PE = Program Exposure; PQ = Program Quality.

Source: processed data

The Fornell–Larcker results show that the diagonal values generally exceeded the corresponding inter-construct correlations. One exception was observed between Program Exposure and Program Quality, where the correlation (0.843) slightly exceeded the square root of AVE for Program Exposure (0.829). This indicates a high empirical association between these two dimensions, while the remaining construct comparisons satisfied the Fornell–Larcker criterion.

Structural Model Analysis – Stage 1

After the adequacy of the first-order measurement model was assessed, the structural model was evaluated to examine the direct effects of Program Exposure, Program Quality, and Program Accessibility on Healthy Food Preference, Changes in Consumption Habits, and Nutritious Food Consumption Frequency. Hypothesis testing was based on the standardized path coefficient (β), t-statistic, and p-value, with statistical significance determined at $p < 0.05$.

Table 4. Dimensional Structural Model and Hypothesis Testing – Stage 1

Hypothesis	Structural Path	β	t-value	p-value	Decision
H1a	Program Exposure → Healthy Food Preference	0.374	3.118	0.002	Supported
H1b	Program Exposure → Changes in Consumption Habits	0.472	3.591	<0.001	Supported
H1c	Program Exposure → Nutritious Food Consumption Frequency	0.116	0.976	0.329	Not Supported
H1d	Program Quality → Healthy Food Preference	0.311	2.423	0.015	Supported
H1e	Program Quality → Changes in Consumption Habits	0.116	0.897	0.370	Not Supported
H1f	Program Quality → Nutritious Food Consumption Frequency	0.591	4.627	<0.001	Supported
H1g	Program Accessibility → Healthy Food Preference	0.136	1.170	0.242	Not Supported
H1h	Program Accessibility → Changes in Consumption Habits	0.230	1.922	0.055	Not Supported
H1i	Program Accessibility → Nutritious Food Consumption Frequency	0.110	0.821	0.412	Not Supported

Source: processed data

Four of the nine dimensional hypotheses were supported. Program Exposure had positive and significant effects on Healthy Food Preference ($\beta = 0.374$, $p = 0.002$) and Changes in Consumption Habits ($\beta = 0.472$, $p < 0.001$), but not on Nutritious Food Consumption Frequency ($\beta = 0.116$, $p = 0.329$). Program Quality significantly influenced Healthy Food Preference ($\beta = 0.311$, $p = 0.015$) and Nutritious Food Consumption Frequency ($\beta = 0.591$, $p < 0.001$), while its

effect on Changes in Consumption Habits was not significant (β = 0.116, p = 0.370). Program Accessibility did not significantly influence Healthy Food Preference (β = 0.136, p = 0.242), Changes in Consumption Habits (β = 0.230, p = 0.055), or Nutritious Food Consumption Frequency (β = 0.110, p = 0.412). These findings indicate heterogeneous dimensional effects across the first-order relationships.

Stage 2

Stage 2 used the first-order construct scores to estimate the higher-order constructs of MBG Program and Change in Students' Consumption Behavior. Program Accessibility, Program Exposure, and Program Quality represented the MBG Program, while Changes in Consumption Habits, Healthy Food Preference, and Nutritious Food Consumption Frequency represented Change in Students' Consumption Behavior.

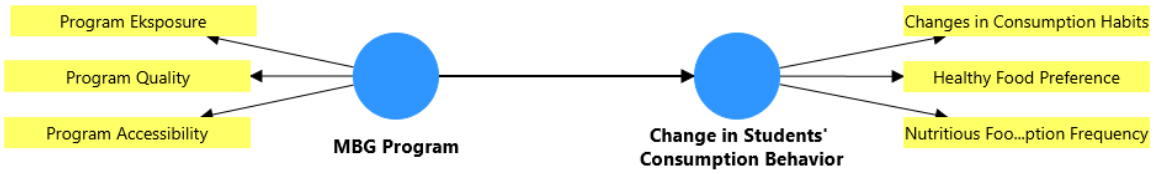

Figure 2. Higher-Order Measurement Model (Stage 2)

Measurement Model Analysis – Stage 2

The higher-order measurement model was evaluated using dimension loadings, Cronbach's Alpha, Composite Reliability, and Average Variance Extracted (AVE). The results are presented in Table 5.

Table 5. Higher-Order Measurement Model Assessment – Stage 2

Higher-Order Construct	Dimension	Loading	Cronbach's Alpha	CR (rho_c)	AVE
MBG Program	Program Accessibility	0.929	0.933	0.957	0.881
	Program Exposure	0.944			
	Program Quality	0.944			
Change in Students' Consumption Behavior	Changes in Consumption Habits	0.935	0.908	0.943	0.845
	Healthy Food Preference	0.924			
	Nutritious Food Consumption Frequency	0.898			

Source: processed data

All dimensions loaded strongly on their respective higher-order constructs, with loadings ranging from 0.929 to 0.944 for the MBG Program and from 0.898 to 0.935 for Change in Students' Consumption Behavior. Both constructs demonstrated high internal consistency, with Cronbach's Alpha and Composite Reliability values above 0.90. AVE values also exceeded the recommended 0.50 threshold, indicating satisfactory convergent validity at the higher-order level (Hair et al., 2021).

Structural Model Analysis – Stage 2

The structural model was evaluated to examine the effect of the MBG Program on Change in Students' Consumption Behavior. The assessment included collinearity through the Inner Variance Inflation Factor (VIF), the standardized path coefficient, t-statistic, p-value, 95% confidence interval, and effect size (f^2).

Table 6. Structural Model and Hypothesis Testing – Stage 2

Hypothesis	Relationship	β	STDEV	t-statistic	p-value	95% CI	Inner VIF	f^2	Decision
H1	MBG Program → Change in Students' Consumption Behavior	0.838	0.032	26.128	<0.001	0.767–0.891	1.000	2.359	Supported

Source: processed data

The MBG Program had a positive and significant effect on Change in Students' Consumption Behavior ($\beta = 0.838$, $t = 26.128$, $p < 0.001$). The 95% confidence interval ranged from 0.767 to 0.891 and did not include zero, confirming the direction and stability of the estimated relationship. The Inner VIF value of 1.000 indicated no collinearity concern, while the effect size of $f^2 = 2.359$ indicated a very large contribution of the MBG Program to changes in students' consumption behavior. Therefore, H1 was supported.

Table 7. Explanatory Power and Model Fit

Endogenous Construct	R^2	Adjusted R^2	SRMR Saturated	SRMR Estimated	Interpretation
Change in Students' Consumption Behavior	0.702	0.700	0.043	0.043	Substantial explanatory power; acceptable model fit

Source: processed data

The MBG Program explained 70.2% of the variance in Change in Students' Consumption Behavior ($R^2 = 0.702$), while the adjusted R^2 value of 0.700 indicated that the model retained stable explanatory power after adjustment. The SRMR value of 0.043 for both the saturated and estimated

models was below the commonly used threshold of 0.08, indicating acceptable model fit (Hair et al., 2021).

Table 8. Predictive Relevance and PLSpredict

Dimension of Change in Students' Consumption Behavior	Q^2predict	PLS-SEM RMSE	PLS-SEM MAE	LM RMSE	LM MAE
Changes in Consumption Habits	0.586	0.648	0.490	0.653	0.497
Healthy Food Preference	0.594	0.642	0.525	0.652	0.529
Nutritious Food Consumption Frequency	0.584	0.650	0.476	0.645	0.471

Source: processed data

All Q^2predict values were positive (0.584–0.594), indicating predictive relevance. PLS-SEM outperformed the linear model for Changes in Consumption Habits and Healthy Food Preference, while predictive performance for Nutritious Food Consumption Frequency was relatively comparable.

Overall, the two-stage assessment supported the higher-order model while retaining the dimensional differences revealed at Stage 1.

Program Exposure and Students' Consumption Behavior

Program Exposure significantly influenced Healthy Food Preference ($\beta = 0.374$, $p = 0.002$) and Changes in Consumption Habits ($\beta = 0.472$, $p < 0.001$), but not Nutritious Food Consumption Frequency ($\beta = 0.116$, $p = 0.329$). This pattern suggests that repeated exposure to the MBG Program is more effective in shaping students' food preferences and consumption habits than in directly increasing the frequency of nutritious food consumption. The finding supports the view that consistent environmental exposure can gradually influence food choices and habitual behavior through repeated experience (Albarracín et al., 2024; García-Muñoz et al., 2022; Ran et al., 2024).

However, exposure alone does not appear sufficient to change all dimensions of consumption behavior (Nguyen et al., 2021). Previous studies indicate that school-based food interventions can create healthier consumption environments through repeated food provision and exposure (Capper et al., 2022; Durão et al., 2024; Pramesthi et al., 2025; Teo et al., 2021). The non-significant effect on Nutritious Food Consumption Frequency suggests that regular nutritious food consumption may also depend on food availability and consumption environments beyond school (Pramesthi et al., 2025; Ryan et al., 2022). Program Exposure therefore appears to function primarily as an initial mechanism for shaping healthier preferences and habits rather than as a sufficient condition for consistently increasing nutritious food consumption.

Program Quality and Students' Consumption Behavior

Program Quality significantly influenced Healthy Food Preference ($\beta = 0.311$, $p = 0.015$) and Nutritious Food Consumption Frequency ($\beta = 0.591$, $p < 0.001$), but not Changes in Consumption Habits ($\beta = 0.116$, $p = 0.370$). This finding indicates that the quality of the MBG Program, reflected in menu variety, taste, suitability for consumption, and perceived nutritional value, is more influential in strengthening students' preference for healthy food and increasing nutritious food consumption than in directly changing their established consumption habits (Reyes-Marcelino et al., 2021). This is consistent with studies emphasizing that food quality and nutritional value are important components of a healthier school food experience (József Tóth et al., 2023; Teo et al., 2021; World Health Organization, 2021).

The non-significant effect on Changes in Consumption Habits suggests that positive food quality alone may not be sufficient to alter pre-existing routines. Consumption habits are shaped by broader and more persistent influences, including family practices, snacking patterns, and food choices outside school. This interpretation is consistent with the view that favorable consumption experiences can strengthen acceptance of healthy food, while habitual change requires longer adaptation and sustained environmental support (Albarracín et al., 2024; Fatemi et al., 2025) Program Quality therefore appears to play a stronger role in reinforcing acceptance and actual nutritious food consumption than in immediately transforming students' broader consumption habits (Haney et al., 2023; Pramesthi et al., 2025).

Program Accessibility and Students' Consumption Behavior

Program Accessibility did not significantly influence Healthy Food Preference ($\beta = 0.136$, $p = 0.242$), Changes in Consumption Habits ($\beta = 0.230$, $p = 0.055$), or Nutritious Food Consumption Frequency ($\beta = 0.110$, $p = 0.412$). This pattern indicates that ease of access to MBG meals and students' participation in the program were not sufficient, on their own, to directly shape food preferences, alter consumption habits, or increase the frequency of nutritious food consumption. Although the relationship with Changes in Consumption Habits approached the conventional significance threshold, the evidence still does not support a direct effect of accessibility on students' consumption behavior.

This finding qualifies the assumption that easier access to nutritious food will automatically translate into behavioral change. World Food Programme (2023) emphasizes the importance of equitable access in school feeding implementation, while Rogers (2003) highlights access and participation as factors that can facilitate adoption. School nutrition environments also depend on the interaction between food availability, access, and supportive school practices (Merlo et al., 2023). However, the present results suggest that accessibility may function more as an enabling condition than as a direct behavioral driver (Gell et al., 2023). Without repeated consumption experience and adequate program quality, access alone may be insufficient to produce measurable

changes in students' eating behavior. Program Accessibility therefore appears to support the implementation of the MBG Program rather than independently determine behavioral outcomes.

MBG Program and Change in Students' Consumption Behavior

At the higher-order level, the MBG Program had a strong positive effect on Change in Students' Consumption Behavior ($\beta = 0.838$, $t = 26.128$, $p < 0.001$), explaining 70.2% of its variance ($R^2 = 0.702$). This result indicates that when Program Exposure, Program Quality, and Program Accessibility are considered as an integrated implementation construct, the MBG Program exerts a substantial influence on students' healthy food preferences, consumption habits, and nutritious food consumption frequency.

The finding suggests that the effectiveness of the MBG Program is not determined by a single implementation dimension, but by the combined operation of exposure, program quality, and accessibility (Liguori et al., 2024). This interpretation is consistent with behavioral change perspectives that position environmental interventions as stimuli capable of gradually shaping consumption patterns (Albarracín et al., 2024; Ran et al., 2024), as well as with evidence showing that structured school food environments can encourage healthier food choices (Berger et al., 2020; Capper et al., 2022; Durão et al., 2024). The strength of the higher-order relationship therefore lies in the integration of program components rather than in the isolated effect of each dimension.

Synthesis of Findings

Taken together, the findings reveal an important distinction between dimensional and overall program effects. At Stage 1, Program Exposure and Program Quality showed selective effects across the dimensions of students' consumption behavior, whereas Program Accessibility did not demonstrate significant direct effects. At Stage 2, however, the MBG Program as an integrated higher-order construct strongly influenced Change in Students' Consumption Behavior. This pattern indicates that the effectiveness of MBG is better understood as the combined contribution of its implementation dimensions rather than as the independent influence of each component.

These findings extend the understanding of school feeding programs by showing that providing nutritious meals is not merely a matter of food distribution. Behavioral change appears to emerge from the interaction between repeated exposure, the quality of students' food experiences, and access to the program (Wethington et al., 2020). In this sense, the MBG Program functions not only as a nutritional intervention but also as a school-based environment that can gradually reinforce healthier consumption patterns. This interpretation is consistent with evidence that sustained school food interventions can shape dietary behavior when food provision is embedded within a supportive and repeated consumption environment (Capper et al., 2022; Durão et al., 2024; Teo et al., 2021).

4. Conclusion

This study demonstrates that the Free Nutritious Meals Program (MBG) significantly contributes to changes in students' consumption behavior, although its dimensional effects are heterogeneous. At Stage 1, Program Exposure significantly influenced Healthy Food Preference and Changes in Consumption Habits, while Program Quality significantly influenced Healthy Food Preference and Nutritious Food Consumption Frequency. In contrast, Program Accessibility did not significantly influence any of the three behavioral dimensions. These findings indicate that repeated exposure and program quality play more prominent roles in shaping students' consumption behavior than accessibility alone.

At Stage 2, the MBG Program had a strong positive effect on Change in Students' Consumption Behavior ($\beta = 0.838$, $t = 26.128$, $p < 0.001$), explaining 70.2% of its variance. The combined findings suggest that MBG is more influential when understood as an integrated multidimensional program rather than through its implementation dimensions in isolation. Program Exposure contributes to the formation of healthier preferences and consumption habits, while Program Quality strengthens healthy food preferences and the frequency of nutritious food consumption. Accessibility, although important for program implementation, was not sufficient on its own to produce direct behavioral change.

These findings suggest that the sustainability of MBG should extend beyond ensuring meal distribution and accessibility (Liguori et al., 2024; Pramesthi et al., 2025). Program implementation should prioritize consistent exposure, menu quality, nutritional value, and positive consumption experiences while strengthening supportive school and household food environments that can sustain healthier consumption patterns. Future research may extend the model by examining family, social, and school environmental factors, as well as longitudinal changes in students' consumption behavior to determine whether the behavioral effects of MBG persist over time.

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