



## **Relationship of Preschool Teachers' Food Skills addressing Food Neophobia and Training Moderation: Structural Equation Model**

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Food neophobia can significantly impact children's learning outcomes and overall well-being. However, the specific food skills competencies required to address food neophobia (FSFN) are often complex, and overlooked, particularly in the context of preschool education. This study aims to develop a framework of FSFN tailored for government preschool teachers in Malaysia, who are trained to work with children from aged 4 to 6 years. By employing the Iceberg Model domains, the framework investigates the relationships between technical skills (TC), non-technical skills (NT), personality traits (PT), self-concept (SC), and motives (MV) pertaining to FSFN. Additionally, the study explores the moderating effect of food skills training on these interrelationships. A sample of 351 government preschool teachers in Malaysia participated in the study, utilizing a predictive-causal research design. findings demonstrate that both PT and SC significantly and positively influence teachers' TC and NT related to FSFN competencies. However, the study found no evidence to suggest that the presence of food skills training moderates these relationships. FSFN framework was proved reliable, valid, and possessed sufficient predictive relevance for measuring both TC and NT. It holds potential for replication and offers valuable insights for informing future research endeavors in this area.

Keywords: food skills, food neophobia, competency framework, preschool teacher, PLS-SEM

### **INTRODUCTION**

Food neophobia, characterized by an aversion to novel and unfamiliar foods, particularly those perceived as healthy, poses significant challenges in early childhood (Gandolini, Borghini and Lafraire, 2024; Białek-Dratwa and Kowalski, 2024). Its impact extends to children's nutritional intake, hindering the development of healthy eating habits and potentially leading to long-term health complications and academic performance issues (Białek-Dratwa and Kowalski, 2024; Wolstenholme et al., 2022;

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2020). To address food neophobia among preschool children, preschool teachers require specific food skills competencies.

These competencies encompass a comprehensive understanding of food neophobia, its associated factors, its impact on children's eating habits, and strategies to mitigate its effects. Research indicates that management approaches, including dietary and psychological interventions at preschool mealtimes, can effectively reduce food neophobia in children (Białek-Dratwa et al., 2022).

However, teachers often face barriers in teaching students about healthy eating, primarily due to a lack of nutrition knowledge and food skills confidence, especially among those without health and food skills - related training (Rachman et al., 2020; Vio et al., 2018). Preschool teachers must be equipped with an understanding of the role of sensory-based food education in addressing food neophobia, guiding the design of effective educational interventions and instructions (Kähkönen et al., 2018; Białek-Dratwa et al., 2022; Koziół-Kozakowska et al., 2018). It is also essential for teachers to recognize that food neophobia is not an unchangeable personality trait and that interventions can effectively reduce it (Białek-Dratwa and Kowalski, 2024; Koziół-Kozakowska et al., 2018).

Competencies in food skills are crucial for preschool teachers to deliver quality food-related education and ensure the provision of nutritious meals for young children in educational settings (MNU, 2021; MOE, 2017). These competencies encompass technical skills (TC), non-technical skills (NT), personality traits (PT), self-concept (SC), and motives (MV) of the preschool teacher (Ardilla et al., 2021; UNESCO Bangkok and SEAMEO, 2018).

TC can be defined as "hard skills" that may encompass academic skills or knowledge of specific tools, processes, and technologies (Handrianto et al., 2024; Shamim, Al-Mamun and Raihan, 2023). In the context of this study, TC is operationalized as the specialized and practical food related knowledge, skills and abilities demonstrated by preschool teachers and assistants in addressing food neophobia. These skills include ability to safe food handling, age-appropriate cooking techniques, and basic nutrition knowledge reflecting national dietary guidelines for preschool meals (NCCFN, 2021, 2016; Øvrebø, 2017).

NT can be defined as "soft skills", "human skills" or "professional skills" that perceived as an additional value for an individual, and often extending beyond their formally prescribed duties (Handrianto et al., 2024; Shamim, Al-Mamun and Raihan, 2023). In the context of this study, NT is operationalized as interpersonal and intrapersonal skills employed by preschool teachers and assistants to address food neophobia among children. These skills comprise of 21st-century skills, such as cognitive, social, emotional, cooperation, flexibility, autonomous, and innovative skills, essential for imparting food-related knowledge to children (Djatmika, 2023; Sukani and Abd Karim, 2018; Gregory, 2023; Chalkiadaki, 2018).

Moreover, the competencies of preschool teachers extend beyond conventional teaching methods, encompassing PT that influence their approach to food education and

mealtime interactions with children (Intiful et al., 2019; Jin et al., 2018). PT can be defined as personal qualities and characteristics that is relatively permanent and stable in an individual's behavior (Spencer dan Spencer, 1993). In the context of this study, PT specifically pertain to the self-image of preschool teachers and assistants in addressing food neophobia, particularly when interacting with children, parents, peers, administration, and stakeholders. This includes five factors personality by Goldberg (1990) that include openness, emotional stability, extraversion, agreeableness, and conscientiousness.

SC can be defined as an individual's attitudes and values related to job-related requirements, which are influenced by their beliefs about what is significant in terms of living and conducting themselves (Spencer and Spencer, 1993). In the context of this study, SC encompasses the attitudes and values of preschool teachers and assistants concerning the management of food neophobia at preschool. This involves positive attitudes and values related to job responsibilities, healthy eating, and children's growth, influencing teachers' ability to manage food skills education activities effectively (Øvrebø, 2017; Mita et al., 2015; Ainuki et al., 2013).

MV can be defined as a natural, unconscious, and continuous thought that drives, and directs external behavior toward specific actions or objectives (Spencer and Spencer, 1993). In the context of this study, motive represents the natural, unconscious, and continuous thoughts that drive and direct the external behavior of preschool teachers and assistants as they address food neophobia. This encompasses the desire to nurture children's well-being through positive food experiences, with beliefs concerning the importance of various developmental skills shaping teaching approaches (Pažur et al., 2024; Love et al., 2020).

In response to this complex scenario, we have proposed the research framework as shown in Figure 1. Figure 1 illustrates the relationship between PT, SC, MV towards TC, and NT competencies. Each full line represents the direct relationship between five variables ( $H1_1$  to  $H1_6$ ) while the broken lines represent the moderating effects of food skills training on the identified six direct hypothesized relationships ( $H2_1$  to  $H2_6$ ).

Given the inconsistent findings in existing literature, this study underscores the imperative to investigate the potential moderating influence of food skills training on preschool teachers' FSFN competencies. Our hypothesis suggests that more extensive and comprehensive food skills training would enhance FSFN competencies, with teachers who undergo more frequent training exhibiting greater benefits compared to those with less frequent training experience.

Utilizing partial least squares structural equation modeling (PLS-SEM), the study provided innovative insights into the interrelationship between FSFN competencies, moving beyond traditional correlation tests. Additionally, moderation analysis assesses the influence of food skills training on the hypothesized relationships, enhancing methodological rigor and contributing to the advancement of knowledge in this field.

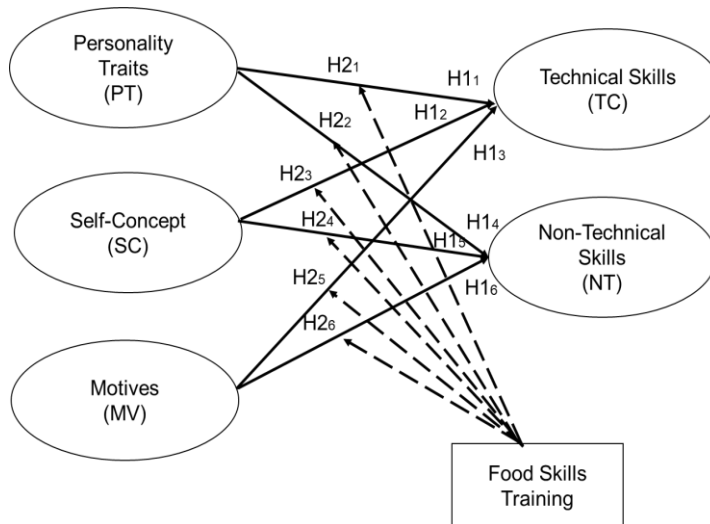


Figure 1

Research framework - personality traits (PT), self-concept (SC), motives (MV) towards technical skills (TC), and non-technical skills (NT), and the moderating effects of food skills training

The research framework of this study was primarily influenced by Boyatzis' (1982) theory, which was further refined by Spencer and Spencer (1993) into the Iceberg Competency Model. This model was selected due to its comprehensive explanation of the FSFN competency elements required for preschool teachers. Theoretically, TC and NT in this study represent competencies within the FSFN context that are challenging to develop and identify but deemed necessary for preschool teachers. Conversely, the behavioral competencies examined in this study encompass PT, SC, and MV. Therefore, the study addresses three primary research questions:

1. Is there a significant relationship between TC and NT competencies with PT, SC and MV competencies of preschool teachers in government preschool in Malaysia?
2. Is training status the moderator variable of the FSFN competency framework for the preschool teachers?
3. What is the proposed FSFN competency framework for preschool teachers in government preschool in Malaysia?

## METHOD

The objective of this study was to examine the interrelationships of FSFN elements observed in previous findings, and the moderating effect of food skills training on these interrelationships. To achieve this objective, descriptive and predictive-causal research designs were employed. The descriptive research design was used to provide descriptive statistics regarding participants' levels of FSFN competencies and their demographic characteristics. Meanwhile, the predictive-causal research design was employed to

assess the hypothesized relationships and the moderating effects of food skills training on these relationships within the structural model. Since the study investigates the influence of PT on TC, PT on NT, SC on TC, SC on NT, MV on TC, MV on NT, and the moderating effects of food skills training on these hypothesized relationships, a predictive-causal design is deemed the most suitable research approach for this quantitative phase.

### **Participants**

Participants in this study are selected utilizing a proportionate stratified simple random sampling approach from the population of preschool teachers and assistants working at one of Malaysian government preschools. This approach was adopted to ensure that the study's sample size was statistically representative and capable of providing reliable and valid results that can be generalized.

Malaysian government preschools adhere strictly to the National Preschool Curriculum set by the Malaysian Ministry of Education and follow the standard guidelines for menu planning, food preparation, and food serving as advised by the Nutrition Division of the Ministry of Health. Both preschool teachers and assistants are responsible for the education and care of registered children aged 4 to 6 years, as well as for preparing quality meals for the children at the preschool.

The total population of teachers and assistants at Malaysian government preschools was 2,884. To determine the minimum sample size required for this quantitative study, Krejcie and Morgan's (1970) formula was utilized. With a population size of 2884, an assumed population proportion of 0.50, and a degree of accuracy of 0.05, the calculated minimum sample size required was 339. The study was able to collect 351 responses, indicating that the sample size used in the study robustly supports the results of the Partial Least Squares Structural Equation Modeling (PLS-SEM) analysis.

Table 1 presents the characteristics of the total 351 participants in the study. Of these, 183 (52.1%) were teachers and 168 (47.9%) were teacher assistants. The majority of participants were female (100%) and of Malay ethnicity (94.6%). A significant proportion of respondents (72.9%) resided in rural areas, and 84.6% reported that their classes were allowed to cook. Regarding age distribution, the largest proportion of respondents fell within the 51 to 60 years (31.67%) and 41 to 50 years (23.6%), followed by 20 to 30 years (12.5%) and 31 to 40 years (11.3%) age groups. Moreover, 24.5% reported having more than 26 years of experience, while 23.4% indicated having 9 to 15 years of experience as preschool teachers.

In terms of the number of food skills training attended by the participants, 45.3% reported attending at least one or two training sessions during their service, followed by 3 to 4 times (25.9%), with 19.1% reporting attending more than 6 training sessions. Notably, this proportion was higher among teacher assistants (55.7%) compared to teachers (33.9%). Regarding educational qualifications, all respondents possessed at least an SPM qualification, with 55% holding STPM or equivalent diploma qualifications, 5.1% having a degree, and 0.6% holding a master's degree.

Table 1  
Demographic characteristics of the participants

Demographic characteristics	Frequency	Percent
<i>Job Position</i>		
Teacher	183	52.1
Assistant	168	47.9
<i>Age</i>		
20-30	44	12.5
31-40	32.2	11.3
41-50	83	23.6
51-60	111	31.6
<i>Ethnics</i>		
Malay	332	94.6
Chinese	5	1.1
Indian	10	2.8
Others	5	1.4
<i>Geographical Area</i>		
Urban	256	72.9
Rural	95	27.1
<i>Cook Permission</i>		
Yes	297	84.6
No	54	15.4
<i>Length of Services</i>		
0– 3 years	43	12.3
5 – 8 years	45	12.8
9 – 15 years	82	23.4
16 – 20 years	48	13.7
21 – 25 years	47	13.4
>26 years	86	24.5
<i>Highest Education Level</i>		
SPM	138	39.3
STPM/Diploma	193	55.0
Degree	18	5.1
Master	2	0.6
<i>Food Skills Training Status</i>		
Never	10	2.8
1– 2 times	159	45.3
3 – 4 times	91	25.9
5 – 6 times	24	6.8
>6 times	67	19.1

### Research Procedure

A survey comprising two sections was utilized for data collection. The first section gathered demographic information including age, ethnicity, geographical location of the preschool, permission for cooking in class, job position, length of service, educational attainment, and the frequency of food skills training attended during their service. The second section focused on FSFN competencies, encompassing 123 items categorized into TC (67 items), NT (18 items), PT (18 items), SC (10 items), and MV (10 items).

Participants rated these competencies using a five-point Likert scale ranging from 1 = Not at All True of Me to 5 = Completely True of Me. This Likert scale was selected for its suitability in identifying competence (Borich, 1980).

The 123 competency items were developed based on prior research by the authors, which involved document analysis and interviews with a subset of the population, followed by surveys with a smaller sample. After several pilot studies, the instruments underwent refinement through construct validity, face validity, and content validity by experts in food skills, nutrition, and early childhood education. The second pilot study, involving 31 teachers from a Malaysian government preschool, utilized the Rasch measurement model for analysis (Saipudin et al., 2023). Subsequently, 36 ineligible items were eliminated, leaving 123 items for administration to a larger sample of 351 participants in the current study.

Data collection was conducted online via Google Forms, with respondents invited to participate voluntarily. Assurance of response confidentiality and participant anonymity was provided, and only those who consented to participate were included in the data collection.

Ethics approval for the study was obtained from Universiti Teknologi Malaysia [UTM.J.53.05.02/13.11/1/4Jld23(67)], *Jabatan Perpaduan Negara dan Integrasi Nasional* (JPNIN) [JPN.05/550/267Jld2 (37)] and *Institut Kajian dan Latihan Integrasi Nasional* (IKLIN) [IKLIN.01/267/42.Jld2 (31)]. The procedure of conducting this study was authorized by both agencies related to early childhood education and training operating under the *Kementerian Perpaduan Malaysia*, headquartered in Putrajaya, and spanning four additional designated four states in Johor (South Zone), Penang (North Zone), Pahang (East Zone), and Selangor (Central Zone).

### **Data Analysis**

Partial least squares – structural equation modelling (PLS-SEM), a variance-based SEM approach, was employed to estimate the parameters of the model. The assessment of the PLS-SEM results involved evaluations of the measurement model and the structural model. The evaluation of the measurement model included tests for internal consistency reliability, convergent validity, and discriminant validity. Evaluation of the structural model involved assessing collinearity, path coefficients, coefficient of determination, effect sizes, and predictive relevance (Hair et al., 2017; Samani, 2016). Furthermore, a moderation analysis was performed to measure the moderating effects of food skills training on the hypothesized relationships. The software Smart PLS version 4.0 was used in the conduct of PLS-SEM (Ringle, Wende, and Becker, 2022).

## **FINDINGS**

### **Descriptive Statistics of The Reflective Constructs**

Table 2 shows the descriptive statistics of the reflective constructs used in the present study. It can be gleaned from the results of 351 participants, that all the items in five constructs in FSFN is said to be satisfactory, highly favorable and probably competent as reflected with an overall interpretation of each construct's mean score within 3.01 –

5.00. In which, the highest mean scores were reported in SC construct ( $M = 4.25$ ,  $SD = 0.55$ ) followed by MV construct ( $M = 4.14$ ,  $SD = 0.58$ ) and PT construct ( $M = 4.12$ ,  $SD = 0.58$ ), then NT construct ( $M = 4.03$ ,  $SD = 0.57$ ) and lastly TC construct ( $M = 3.84$ ,  $SD = 0.66$ ). The findings indicate that the lowest score related to food preparation skills and food pedagogy skills in the TC construct, which specifically on the knowledge on how to convert recipe based on weight and measurement conversion ( $M = 3.27$ ,  $SD = 0.77$ ); followed by ability to cook simple dishes of main ethnic's dishes ( $M = 3.46$ ,  $SD = 0.75$ ) and basic knowledge among preschool teachers in identifying neurodevelopmental problems in children (i.e., speech delay, ADHD, and ASD) that showing difficulties with feeding, eating concerns, and learning style ( $M = 3.46$ ,  $SD = 0.79$ ).

Table 2  
Descriptive statistics for the reflective constructs

Construct	Items	Mean	SD	Interpretation
Technical Skills	1 – 67	3.84	0.66	Competent
Non-technical Skills	68 – 85	4.03	0.57	Competent
Personality Traits	86 – 103	4.12	0.58	Competent
Self-concept	104 – 113	4.25	0.55	Competent
Motives	114 – 123	4.14	0.58	Competent

Note(s): Mean score falling between 1.00 – 3.00: indicate probably not competent and not possessing FSFN competencies; 3.01 – 5.00: suggest probably competent and possessing the FSFN competencies. SD: standard deviation

### Evaluation of Measurement Model

Table 3 presents the evaluation of the reflective measurement model by the construct used in the study. The Cronbach's Alpha values which range from 0.961 to 0.979, exceed the recommended threshold of 0.7 (Hair, Ringle, and Sarstedt, 2011). The Composite Reliability Index for all constructs also exceeded the minimum cut-off value of 0.7 for each data set, ranging from 0.966 to 0.980. These findings indicate that the measurement model's internal consistency is reliable.

Table 3  
The evaluation report of the reflective measurement model

Construct	Indicator Reliability	Convergent Validity	Internal Consistency Reliability		Discriminant Validity
	Outer Loading (>0.60)	AVE (>0.50)	Composite Reliability (>0.70)	Cronback Alpha (>0.70)	HTMT
Technical Skills	0.656 to 0.900	0.529	0.980	0.979	HTMT < 0.9 CI < 1.0
Non-technical Skills		0.628	0.968	0.965	
Personality Traits		0.641	0.968	0.965	
Self-concept		0.744	0.967	0.962	
Motives		0.738	0.966	0.961	



After confirming the internal consistency, the indicator reliability is measured. A total of 99 items exhibited satisfactory indicator reliability, with values ranging from 0.656 to 0.900. Furthermore, all Average Variance Extracted (AVE) scores exceeded 0.5, which meets the threshold value set by Hair et al. (2017). As a result, one item from PT and 23 items from TC with low loadings were subsequently deleted. Since the number of deletions did not exceed 20% of the model's indicators, the removal of these 24 items (19.5%) at this stage aligns with the recommendation made by Ramayah et al. (2018).

Additionally, all constructs in the measurement model exhibit satisfactory discriminant validity through the results of heterotrait-monotrait ratio of correlations (HTMT) value below 0.90 and none of the upper bounds of the 95% confidence intervals for HTMT exceeded 1, which suggests all reflective constructs exhibit convergent validity, internal consistency reliability, and discriminant validity (Ramayah et al., 2018). Therefore, based on the analysis conducted, 24 items were dropped as they did not meet PLS-SEM requirements. The total number of items retained was 99 indicators.

### Evaluation Of Structural Model

Table 4 reflect the structural model and the beta coefficients of each path. The results indicate a positive and direct relationship between several variables. Specifically, the analysis reveals significant relationships for PT → TC ( $\beta=0.630$ ,  $t=10.511$ ,  $p<0.05$ ), SC → TC ( $\beta=0.135$ ,  $t\text{-value}=2.011$ ,  $p<0.05$ ), and PT → NT ( $\beta=0.803$ ,  $t\text{-value}=18.154$ ,  $p<0.05$ ). Since the t-tests for these three relationships yield values greater than 1.96, it can be concluded that the structural model supports the presence of significant relationships path coefficient. Additionally, these relationships exhibit moderate ( $f^2 = 0.313$ ), small ( $f^2 = 0.011$ ), and large ( $f^2 = 1.165$ ) effect sizes, respectively, indicating their meaningful impact. Consequently, these results then indicate that the Ha<sub>11</sub>, Ha<sub>12</sub>, and Ha<sub>14</sub> hypothesis are supported, which suggest the existence of relationships between PT and TC; SC and TC; PT and NT, respectively. This signifying that as the PT and SC of the teachers increases, their TC and NT related to FSFN competencies increases in the same direction too.

Furthermore, the study also examined the relationships between other variables. Specifically, a positive and direct relationship was observed for SC → NT ( $\beta=0.009$ ,  $t\text{-value}=0.149$ ,  $p=0.882$ ) and MV → NT ( $\beta=0.090$ ,  $t\text{-value}=1.221$ ,  $p=0.222$ ). However, a negative relationship was found for MV → TC ( $\beta=-0.043$ ,  $t\text{-value}=0.149$ ,  $p=0.882$ ). Unfortunately, none of these relationships yielded significant differences ( $p>0.05$ ). Therefore, it can be concluded that the hypotheses Ha<sub>13</sub>, Ha<sub>15</sub>, and Ha<sub>6</sub> were not supported.

Moderation analysis was conducted in the present study to examine the interaction effect of food skills training on the direct relationships between the six hypotheses posited: PT → TC, SC → TC, MV → TC, PT → NT, SC → NT, and MV → NT. Results indicate that none of the links demonstrate food skills training acting as a moderator ( $p > 0.05$ ). This suggests that positive personality, attitudes, values, and motivational factors exhibited by teachers do not demonstrate a significant influence on the enhancement of their food related technical and non-technical performances. Furthermore, the efficacy of these factors does not exhibit improvement with an

increase in the frequency of food skills training. Consequently, all the hypotheses H2<sub>1</sub> until H2<sub>6</sub> are not supported.

In summary, three hypotheses were accepted, other three hypotheses and all moderating hypotheses were rejected. The analysis showed that all hypotheses had the recommended path coefficient values of  $\beta = 1$  and 1 and t values > 1.96. The decision to accept and reject this hypothesis was taken based on  $p < 0.05$  (Hair et al., 2017).

Table 4

Findings from the analysis of structural measurement models - direct and moderating effects

Hypothesis	Path coefficient	p-value	Standard error	Effect size	Decision
<i>Direct Effects</i>					
H1 <sub>1</sub> . PT→TC	0.630	0.000	0.060	0.313	Supported
H1 <sub>2</sub> . SC→TC	0.135	0.044	0.067	0.011	Supported
H1 <sub>3</sub> . MV→TC	-0.043	0.594	0.080	0.001	Not Supported
H1 <sub>4</sub> . PT→NT	0.803	0.000	0.044	1.165	Supported
H1 <sub>5</sub> . SC→NT	0.009	0.882	0.063	0.000	Not Supported
H1 <sub>6</sub> . MV→NT	0.090	0.222	0.074	0.009	Not Supported
<i>Moderating Effects</i>					
H2 <sub>1</sub> . TRAIN*PT→TC	-0.037	0.498	0.055	0.003	Not Supported
H2 <sub>2</sub> . TRAIN*SC→TC	0.062	0.289	0.058	0.008	Not Supported
H2 <sub>3</sub> . TRAIN*MV→TC	0.007	0.911	0.067	0.013	Not Supported
H2 <sub>4</sub> . TRAIN*PT→NT	-0.068	0.139	0.046	0.018	Not Supported
H2 <sub>5</sub> . TRAIN*SC→NT	0.090	0.074	0.050	-0.004	Not Supported
H2 <sub>6</sub> . TRAIN*MV→NT	-0.019	0.768	0.065	0.007	Not Supported

Note(s): TC – technical skills; NT – non-technical skills; PT– personality traits; SC – self-concept; MV – motives; TRAIN – food skills training;  $f^2$  is the effect sizes (Cohen, 1988) where 0.02 5 small, 0.15 5 medium, 0.35 5 large

### Framework of Food Skills Competencies and the Moderating Role of Food Skills Training

Subsequent analysis involved tests based on coefficient criteria of determination ( $R^2$ ), effect size assessment ( $f^2$ ), predictive relevance ( $Q^2$ ), and effect size assessment ( $q^2$ ). To avoid the structural model from collinearity problems, the values of full collinearity through Variance inflation factor (VIF) must be less than 5.00 (Hair, Ringle, and Sarstedt, 2011). As reflected in Table 5, all constructs of FSFN competencies are within the acceptable thresholds and has no collinearity issues.

Table 5

Variance inflation factor (VIF), and t-values of the path models

Relationship	t-value	VIF
H1 <sub>1</sub> . PT→TC	10.511	2.449
H1 <sub>2</sub> . SC→TC	2.011	3.065
H1 <sub>3</sub> . MV→TC	0.534	4.012
H1 <sub>4</sub> . PT→NT	18.154	2.449
H1 <sub>5</sub> . SC→NT	0.149	3.065
H1 <sub>6</sub> . MV→NT	1.221	4.012

The subsequent analysis involved the total variance of dependent constructs explained by all independent constructs through  $R^2$  assessment. Hair et al. (2017) categorized the value of  $R^2$  into three values, namely large (0.75), medium (0.50), and small (0.25). As seen in Table 6, the expected accuracy values of the model are within the small and large levels.

Table 6  
Results of  $R^2$ , and  $Q^2$  values of endogenous constructs

Construct	$R^2$	$Q^2$
Technical Skills	0.477 (small)	0.469
Non-Technical Skills	0.772 (substantial)	0.767

Lastly, to identify how the endogenous constructs studied are relevant in shaping the model and the measurement model has predictive validity, the values of predictive relevance ( $Q^2$ ) are conducted. This analysis was carried out using the PLS – Predict procedure, in which the  $Q^2$  should be higher than 0 (Shmueli et al., 2019). As seen in Table 6, the results of  $Q^2$  values on the dependent construct for technical skills constructs (0.469) and non-technical skills (0.767) meet the requirement. Since both constructs were recorded to have  $Q^2$  values above zero, this suggests that this model has sufficient predictive relevance for endogenous constructs. Figure 2 shows the results of the PLS test on the full model.

## DISCUSSION

Analysis of the data reveals that those hidden qualities, particularly PT bear a noteworthy and meaningful relationship with both of TC and NT performances. Notably, based on the findings, the quality of PT was found to have a huge and moderate significant direct relationship on TC and NT respectively, while SC was found to have a small significant direct relationship on TC only, as evidenced by the computed effect size. This, in turn, affirms the acceptance of hypotheses Ha1<sub>1</sub>, Ha1<sub>2</sub>, and Ha1<sub>4</sub>. In short, PT and SC of the preschool teachers are an integral factor when it comes to enhancing TC and NT performances. When preschool teachers are having the right personality, and proper attitude in the context of FSFN, they become more competent in performing various technical and non-technical FSFN related task at the workplace.

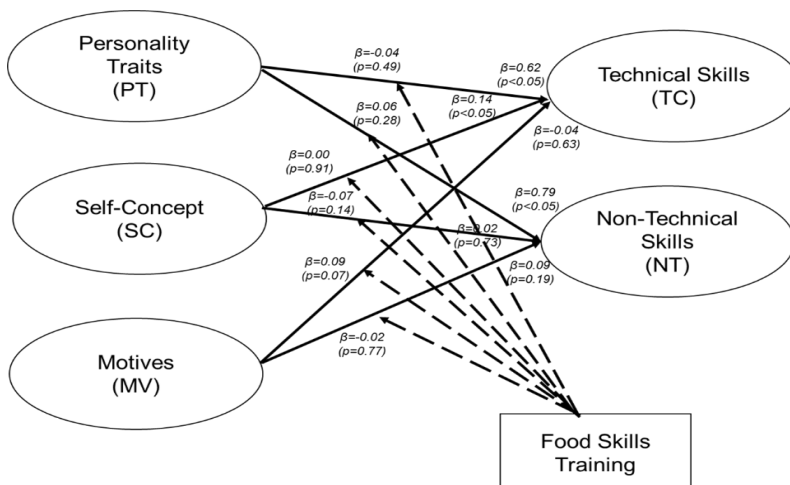


Figure 2

A framework of food skills competencies in addressing food neophobia and the moderating role of food skills training for preschool teacher

Within Five Factor Personality Model, the conducted analyses showed that preschool teachers had higher levels of agreeableness, extraversion, conscientiousness, openness to experience, and emotional stability. Similarly, as seen in other studies, few different interrelationships between certain PT implied at some specificities of personality structure in preschool teachers regarding their professional position as role models in feeding practice (Suyatno; Intiful et al., 2019). For an instance, a teacher who demonstrates high responsiveness for trying new foods, a positive attitude towards healthy eating, and indulgent feeding style can inspire children to adopt similar attitudes and behaviors (Vorkapić, 2017; 2012; Mita et al., 2015; Pan, Song and Wang, 2021).

Additionally, SC and MV of the preschool teachers does not guarantee any effect on TC and both TC, and NT, respectively. This, in turn, affirms the rejection of hypotheses Ha1<sub>3</sub>, Ha1<sub>5</sub>, and Ha1<sub>6</sub>. The findings can be attributed to several factors, including the dynamic and complicated nature of motives itself, which can indeed fluctuate and is not always a fixed trait. The complexity of food skills tasks in the preschool setting may also contribute to these results. Some tasks may be straightforward and require minimal motivation, while others could be more challenging, demanding higher levels of motivation. Therefore, the relationship between motivation and performance may vary depending on the specific tasks being examined. It is also probable that there are mediating variables and external factors play a role in influencing favorable FSFN performances, especially considering that the developed structural model demonstrated the ability to predict up to 47.7% to 77.2% of the factors influencing the FSFN competencies of the participants. In general, the lowest  $R^2$  values acquired in this study closely correspond to the findings reported in the existing literature, which also stood at approximately 43%. (Stocchi et al., 2018).

The present study additionally examined the moderating role of food skills training on the six hypothesized relationships of the structural model. The outcomes of this analysis indicated that frequency of food skills training did not moderate any relationship between FSFN competencies. This, in turn, affirms the rejection of moderation hypotheses Ha<sub>21</sub>, to Ha<sub>26</sub>. Essentially, the frequency of food skills training does not appear to enhance the relationship between favorable personal characteristics related to FSFN (PT, SC, and MV) and the improvement of TC and NT performance among preschool teachers. In the situation of food safety training, this current study has shown contradiction with Aquino et al. (2021), as their study revealed a linkage between food safety attitudes and food safety performances when food safety training acted as a moderator, even though with a small effect size. However, Aquino et al. (2021) had also not identified food safety training was a moderating variable in the relationships between food safety knowledge and food safety attitudes, as well as between food safety knowledge and food safety performances.

This study's outcomes provide a nuanced viewpoint on the potential moderating role of food skills training status. Contrary to initial expectations, the results indicate that the frequency (but not quality or specific content) of food skills training might not significantly amplify the links between specific personal characteristics (PT, SC, MV) and enhanced TC and NT performance among preschool teachers. This underscores the complicated nature of the connection between training, personal attributes, and subsequent performance outcomes, underscoring the necessity for a deeper understanding of the mechanisms that drive the increase of teachers' proficiency in FSFN.

### **Study Implications And Future Research Directions**

This study advances understanding in three keyways with important implications for early childhood education system. Firstly, it developed a framework for FSFN competencies among preschool teachers in Malaysian public preschools, where no such framework previously existed. Through PLS-SEM analysis, five main constructs with 99 indicators were identified, establishing a reliable FSFN competency framework. Thus, practically, the FSFN instrument and framework developed can raise awareness, confidence and enhance competencies among preschool teachers regarding FSFN, this study empowers them to execute food-related tasks more effectively within their daily routines. This can lead to improvements in children's overall well-being, including their physical and aesthetic development, aligning with the goals of the Malaysian early childhood education plan.

Secondly, the study explored the interrelationships between FSFN competencies, highlighting the need for both technical and non-technical skills, positive attitudes, strong motivations, and favorable FSFN behaviors among teachers. This insight can inform recruitment and training processes within the early childhood education system, ensuring that teachers possess a comprehensive set of skills and attributes necessary for effective teaching and food-related tasks.

Thirdly, the study examined the indirect effects of food skills training, suggesting that quality, not quantity, of training matters. Tailored training modules are essential for

career development, fostering a skilled and confident early childhood workforce. This finding can guide policy decision makers regarding professional development programs, emphasizing the need for high-quality, targeted training to enhance the competencies of preschool teachers, ultimately benefiting the education system as a whole.

Several recommendations for future research should be considered, specifically focusing on the factors besides training (e.g., years of experiences) that may have influenced these relationships. Research suggests that factors at the preschool level, such as nutrition policies, leadership of directors, commitment to nutrition, and a positive healthcare and wellness culture, could significantly affect teachers' practices regarding FS and nutrition education. Despite the frequent trainings enforced, this study suggests a shift towards more focused, and higher-quality training content that should also emphasize qualities such as PT, SC and MV for effective TC and NT performances at the workplace. This approach is suggested to be more effective than the broader, generalized concept of food skills for teacher's professional development interventions, which, as indicated by prior research, might tend to remain relatively static over time.

Since this study primarily examined a one-way causal relationship between personal FSFN competencies. Future research could delve into more complex relationship with other factors that may influence teacher's FSFN competencies within the preschool organizational climate, such as job satisfaction, workload, and professional development. Moreover, while this study examined food skills training status as a moderator in the structural model, future research might explore additional moderating variables or consider mediating constructs that could impact the hypothesized relationships differently. This could involve factors related to nutritional and psychological status of the teacher.

## **CONCLUSION**

It has been found that preschool teachers and assistants within Malaysian government preschool institutions are required to possess a comprehensive set of FSFN competencies. These encompass not only technical and non-technical competencies but also encompass qualities such as a positive attitude and values towards food, towards their profession, and towards the children they work with. The present study did not find moderating effect of food skill training status on the relationship between FSFN competencies. The findings of this study suggest that simply attending frequent food skills training may not guarantee the development of favorable personal characteristics, but rather the quality of food skills training modules tailored to specific needs is needed.

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