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Measuring management practices impact on hygiene practices of food handlers: The mediating role of commitment and training perception

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ABSTRACT

The purpose of the study was to assess i) communication, employee involvement, commitment, training perception, and hygiene practices of food handlers working in restaurants in Dubai in the United Arab Emirates (UAE) and ii) impact of management practices through communication and employee involvement on food handler commitment and food safety training perception and eventually on hygiene practices. A cross-sectional survey study was conducted via reliable and validated questionnaire to collect data from food handlers (n = 995) working in restaurants (n = 317) in Dubai (UAE). Exploratory Factor Analysis, Confirmatory Factor Analysis, T-test, one-way ANOVA test and structural equation modeling were conducted. The proposed hypotheses were tested through SEM. The results (agree response percentages) depicted that food handlers had a good (>70%) commitment (80.3%), hygiene practices (77.8%), and employee involvement (71.3%), whereas communication (69.8%) and training perception (67.6%) were found to be moderate (<70%). The results also showed that employee communication and involvement positively (P<0.05) affected employee commitment and food safety training perception. Employee commitment and training perception of food safety positively (P<0.05) affected the hygiene practices of the food handlers. The relationship between hygiene practices and management practices is mediated partially by food handler commitment and the food safety training perception. The findings of this research could be helpful for food safety practitioners in the private and governmental sectors to concentrate more on human aspects of their work management in order to enhance the food handler attitude.

1. Introduction

Foodborne illnesses are a major health issue and attaining acceptable food safety levels has become a strategic health goal (Velusamy, Arshak, Korostynska,). Combating foodborne illnesses is a necessity because of the undesirable effects these can have on trade, tourism and public health (Taylor, Garat, Simreen, & Sarieddine, 2015). Food handlers are key players behind foodborne illnesses; their unhygienic practices besides a careless attitude could contribute to foodborne illnesses outbreaks (da Cunha, Cipullo, Stedefeldt, & de Rosso, 2015; Sabbithi et al., 2017; Walker, Pritchard, & Forsythe, 2003).

Baş, Ersun, and Kıvanç (2006) addressed this issue through a Knowledge, Attitude and Practice (KAP) approach which emphasized food safety knowledge as a major precursor for change in attitude/behavior of the food handlers. However, this premise of adequate knowledge resulting in a positive attitude towards adopting appropriate

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practices in food hygiene was found to be incorrect (Taylor et al., 2011). The fundamental issue is that food handlers are not ignorant about the core concepts of safe food handling, but rather it is their reluctance in bringing their acquired expertise into effect (Mitchell, Fraser, & Bearon, 2007; Sabbithi et al., 2017). For this reason, some researchers investigated how 'organizational variables' impact the attitudes and behaviors of food handlers (Pragle, Harding, & Mack, 2007).

Few studies also attempted to investigate the softer dimensions of risk management, such as safety culture in the organization besides manager and employee attitudes/behaviors towards food safety (de Andrade, Stedefeldt, Zanin, Zanetta, & da Cunha, 2021; de Andrade, Stedefeldt, Zanin, & da Cunha, 2020; Flynn et al., 2019; Jespersen et al., 2019; Nayak & Waterson, 2017; Sharman, Wallace, & Jespersen, 2020; Taha, Osaili, et al., 2020; Yiannas, 2009; Zanin, Stedefeldt, da Silva, da Cunha, & Luning, 2021). Food safety culture plays an integral role in answering the definite challenges associated with food safety performance (Griffith & Jackson, 2017; Jespersen et al., 2019; Nayak & Waterson, 2017).

Management supported practices positively influence employee job behavior and efficiency (Taha, Wilkins, Jouusola, & Osaili, 2020; Cascio, Mariadoss, & Mouri, 2010; Shanock & Eisenberger, 2006). Support from the management makes workers more dedicated to the organization and their job (Armeli, Eisenberger, Fasolo, & Lynch, 1998; Simosi, 2012; Wilkins, Butt, & Annabi, 2017). Supportive management practices in food establishments (i.e. leadership, supervision, communication, training, assessment, engagement of staff, social events, and promotion) (Griffith, 2014; Yiannas, 2009) are required to enhance the efficacy of the food safety management system (Fatimah, Strohbehn, & Arendt, 2014; Vashisht, 2018).

Through the organizational hierarchy, managers can communicate with food handlers as communication is essential to understand food safety practices. Communication between managers and employees, particularly from employees to managers, (in the context of decision-making or suggestions) may decrease employee stress besides improving their commitment, feelings of emotional attachment to their work and understanding of organizational goals (Sharma & Dhar, 2016). Involvement of employees in decision making encourages them to organize and complete their work (Morgan & Zeffane, 2003). Earlier studies have reported a positive relationship between employee involvement and employee commitment (Ekmekçi, 2011; Timming, 2012; Wilkins et al., 2017). Training shapes the attitudes of employees and encourages compliant behavior. Training programs positively impacted food handling practices and decrease the risk of foodborne diseases (Woh, Thong, Behnke, Lewis, & Zain, 2016; Yu, Sirsat, & Neal, 2019).

Appelbaum et al. (2013) reported that employee commitment acted as a mediator between organizational performance and employee involvement. Taha, Wilkins, Juusola, and Osaili (2020) found that communication explicitly had a substantial positive effect on the willingness of food handlers to adopt safe food processes and procedures. In addition, commitment of food handlers also had a major positive effect on the efficiency of organizational food safety.

Albloush et al. (2020) pointed out that perceived training opportunities mediated the relationship between organizational citizenship behavior and performance.

The purpose of this study was therefore to examine i) the communication, employee involvement, training perception, commitment and hygiene practices among food handlers in restaurants in Dubai, ii) the impact of management practices through communication, employee involvement on food handler commitment and food safety training perception and eventually on food safety hygiene practices by using structural equation modeling.

2. Methods and material

2.1. Sampling plan

Nine hundred and ninety-five food handlers from 317 licensed restaurants in Dubai, UAE participated in the study. A convenience sample of three to five food handlers from each restaurant were selected in this cross-sectional survey. Food handlers with a minimum experience of 1 year were requested to complete the questionnaire. The data was collected from August to December 2019. The questionnaires were designed in two different languages i.e. English and Arabic (keeping into consideration the respondents' literacy levels). The participants were explained the objectives of the study by the researchers for better understanding, following which their written consent was taken and responses were recorded.

2.2. Instrumentation

A hard copy questionnaire was used in this survey (Supplementary file). The questionnaire focused on measuring food safety constructs (communication, employee involvement, commitment, training perception, and hygiene practices). In each construct, a 5-point Likert scale was used. The questions of the constructs were adapted from previous validated and reliable published studies: commitment (18 questions) (Abdullah, 2011), communication (6 questions) (Fatimah et al., 2014), training perception (6 questions) (Fatimah et al., 2014), hygiene practices (20 questions) (Al- Dalalah, 2013) and employee involvement (5 questions) (Taha, Wilkins, et al., 2020).

In addition, the demographic details were also inculded in the questinniare (age, gender, education, and years of work experience). The questionnaire contents were checked by six research experts. It was pre-tested on 40 randomly selected food handlers from ten different food establishments. The responses from the questionnaire were positive. The estimated time to complete the questionnaire was about 10–15 min. Kaiser-Meyer-Olkin (KMO) test was carried out to determine the variance adequacy of the items and Bartlett's sphericity's test was used to examine the quality of connections between the items. The results of both tests were 0.952 (>0.60) and the P-value was 0.0 (significant). These results suggest that there is variance adequacy of the questionnaire items that have good connections.

For the purpose of extracting and confirming the valid items of constructs (commitment, communication, training perception, hygiene practices, and employee involvement) Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) were performed. The items with load above 0.40 were only chosen (Hair, Black, Babin, & Anderson, 2010).

Accordingly, six items were removed from the scale of commitment, none from communication, one from training perception, fourteen from hygiene practices, and one from employee involvement. As described in Table 1, commitment, communication, training perception, hygiene practices, and employee involvement had a loading in the range of 0.895–0.461, 0.827–0.743, 0.913–0.664, 0.843–0.607, and 0.796–0.574, respectively. Cronbach's alpha coefficient (reliability test) was found > 0.70. The Harman's one-factor test which was performed to ensure that there is no potential common method bias in the data revealed that bias was not a concern in the data (percentage of cumulative variance [threshold < 50%]) (Table 1). The results of measurement model fit indices were accepted ($\chi 2/df = 4.2$ [threshold ≤ 5], RMR = 0.045 [threshold ≤ 0.08], CFI = 0.921 [threshold > 0.90], TLI = 0.914 [threshold > 0.90], IFI = 0.922 [threshold > 0.90] and RMSEA = 0.057 [threshold < 0.10]).

A discriminant validity test showed that the items were related to each other (Fornell & Larcker, 1981). The data achieved discriminate validity as the Average Variance Extracted (AVE) for each of the respective constructs was more than the Standard Variance (SV) (Table 2).

Table 1
Factor analysis, reliability and means ± standard deviations of commitment, communication, training perception, hygiene practices and employee involvement items.

Construct	Items	Factor loading of items	Percentage of variance	Percentage of cumulative variance	Cronbach's alpha	Mean ± SD
Commitment	COM1: I do feel like 'part of my family' at this organization	0.90	37.594	37.594	0.933	3.93 ± 0.90
	COM2: I really feel as if this organization's problems are my own	0.89				4.19 ± 0.84
	COM3: This organization has a great deal of personal meaning for me	0.85				3.98 ± 0.89
	COM4: I do feel 'emotionally attached' to this organization	0.85				4.00 ± 0.79
	COM5: It would be very hard for me to leave my job at this organization right now even if I wanted to COM6: Too much of my life would be disrupted if I leave my organization	0.81				3.98 ± 0.85
	COM7: I do feel a strong sense of belonging to this organization	0.80				3.98 ± 0.89
	COM8: Right now, staying with my job at this organization is a matter of necessity as much as desire	0.78				4.15 ± 0.85
	COM9: One of the few negative consequences of leaving my job would be the scarcity of available alternative elsewhere	0.77				4.08 ± 0.79
	COM10: I believe I have too few options to consider leaving this organization	0.63				3.68 ± 0.94
	COM11: I would be very happy to spend the rest of my career in this organization	0.62				3.97 ± 0.88
	COM12: The reason I continue to work for this organization is leaving would require considerable personal sacrifice	0.51				4.24 ± 0.86
		0.46				3.99 ± 0.85
Communication	COMMU1: Employees are disciplined or reprimanded when they fail to follow food safety practices	0.83	10.223	47.817	0.881	3.61 ± 0.96
	COMMU2: Food handlers are encouraged to provide suggestions for improving food safety practices	0.79				3.21 ± 1.06
	COMMU3: All of the necessary information for handling food safely is readily available to food handlers	0.79				3.49 ± 1.09
	COMMU4: Managers generally give appropriate instructions on safe food handling	0.78				3.65 ± 1.08
	COMMU5: Managers provide adequate and timely information about current food safety rules and regulations	0.76				3.52 ± 1.02
	COMMU6: Food handlers can freely speak up if they see something that may affect food safety	0.74				3.46 ± 0.96
Training Perception	TP1: Food safety training given to staff is adequate to enable to them to assess hazards in workplace	0.91	6.211	54.028	0.886	3.57 ± 1.09
	TP2: My company gives comprehensive training to the employees in workplace health and food safety issues	0.80				3.20 ± 1.20
	TP3: New recruits are trained adequately to learn food safety rules and procedures	0.83				3.23 ± 1.07
	TP4: Food safety issues are given high priority in training programs	0.74				3.39 ± 1.09
	TP5: Management encourages the staff to attend food safety training programs	0.66				3.52 ± 1.08
Hygienic Practices	PHP1: Do you wear gloves when you handle ready to eat food or prepare sandwiches?	0.843	3.940	57.969	0.850	4.06 ± 0.95
	PHP2: Do you work when you have diarrhea?	0.764				3.90 ± 0.95
	PHP3: Do you wash your hand with water and soap after using the bathroom?	0.728				4.05 ± 0.86
	PHP4: Do you keep cooked meat or chicken at room temperature for more than 4 h?	0.724				3.78 ± 1.08
	PHP5: Do you work when you have cold?	0.687 0.607				3.94 ± 0.94
	PHP6: Do you clean food contact surfaces before and after preparing food?					3.62 ± 1.15
Employee Involvement	EI1: All managers give consistent information about food safety	0.796	3.515	61.483	0.700	3.34 ± 1.01
	EI2: My company has food safety committees consisting of representatives of management and employees	0.743				3.66 ± 0.97
	EI3: Food handlers are encouraged to provide suggestions for improving food safety practices	0.673				3.72 ± 0.88
	EI4: Management consults with employees regularly about workplace health and food safety issues	0.574				3.53 ± 1.05

Table 2
Discriminant validity test amongst the studies constructs.

Constructs	Commitment	Communication	Training perception	hygiene practices	Employee involvement
Commitment	**0.554**				
Communication	0.291	**0.597**			
Training perception	0.168	0.270	**0.612**		
hygiene practices	0.409	0.291	0.448	**0.564**	
Employee involvement	0.137	0.240	0.102	0.062	**0.385**

*Average Variance Extracted (AVE) values are in bold.

2.3. Model

The statement that adequate knowledge resulting in a positive attitude towards adopting appropriate practices in food hygiene was found to be incorrect (Taylor et al., 2011). The human soft aspects should be included in people-management concept more than investigating only the KAP model (Zanin, da Cunha, de Rosso, Capriles, & Stedefeldt, 2017). Based on the relationships illustrated in the research model in Fig. 1, the following hypotheses are formed:

H1. Management practices which positively influence training perception.

H2. Management practices which positively influence commitment.

H3. Management practices which positively influence hygiene practices.

H4. Food handler training positively influences food handler hygiene practices.

H5. Food handler commitment positively influences food handler hygiene practices.

H6. Training perception and commitment mediate the relationship between management practices and food handler hygiene practices.

H7. Training perception and commitment mediate the relationship between employee involvement, and food handler hygiene practices.

H8. Training perception and commitment mediate the relationship between communication, and food handler hygiene practices.

2.4. Statistical analysis

Descriptive and statistical analyses were conducted to examine the collected data. T-test and one-way ANOVA test were conducted. IBM SPSS Statistics and Amos (Version 23.0, IBM Corp., Armonk, NY) was used to perform Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA) and Structural Equation Modeling (SEM). The proposed hypotheses were tested through SEM to demonstrate the relationship between the constructs; clarify the direct and indirect impacts and to measure fitness of the structural model. A P-value of <0.05 was set in this study.

3. Results

3.1. Descriptive statistics

The study was composed of 78.1% male food handlers with 53.6% of them being >26 years of age (Table 3). Approximately 40% of the sample had ≥12 years of experience in foodservice establishments and a higher education (>12 years). Means, standard deviations, and agree response percentages are described in Table (4). The mean, agree response percentage of commitment, communication, training perception, hygiene practices, employee involvement, and management practices were 4.0/5.0 (80.3%), 3.5/5.0 (69.8%), 3.4/5.5 (67.6%), 3.9/5.5 (77.8%), 3.6/5.0 (71.3%), 3.5/5.0 (70.6%), respectively (Table 4).

Furthermore, Table 5 shows that respondents who were educated beyond high school had significantly (P = 0.006) better food safety conduct (87.5%) than those with elementary, middle, and high school education (75, 80, and 77%, respectively). Respondents with a work experience of >6 years, scored a higher mean percentage (78%) (P = 0.006) than those who had < 6 years (75%) experience. Moreover, there was no significant association (p > 0.05) between gender, age and general food safety hygiene practices.

Table 3
Socio-demographic characteristics of food handlers (n = 995) working in restaurants in Dubai, UAE.

Variable	Item	Frequency	Percentage
Gender	Male	777	78.1%
	Female	218	21.9%
Age	<26 years	533	53.6
	26–40 years	150	15.1
	>40 years	312	31.4
Education	Elementary	223	22.4
	education	181	18.2
	Middle school	201	20.2
	High school	390	39.2
	> High school		
Years of experience in food handling	<6 years	223	22.4
	6–11 years	382	38.4
	≥12 years	390	39.2

Table 4
Descriptive statistics (means, standard deviations and agree response percentage) of responses of food handlers working in restaurants in Dubai, UAE.

Construct	Mean	Standard Deviation	agree response percentage
Commitment	4.013	0.65	80.3%
Communication	3.49	0.78	69.8%
Training	3.38	0.91	67.6%
perception	3.89	0.75	77.8%
Hygiene practices			
Employee involvement	3.57	0.71	71.3%
Management practices	3.53	0.63	70.6%

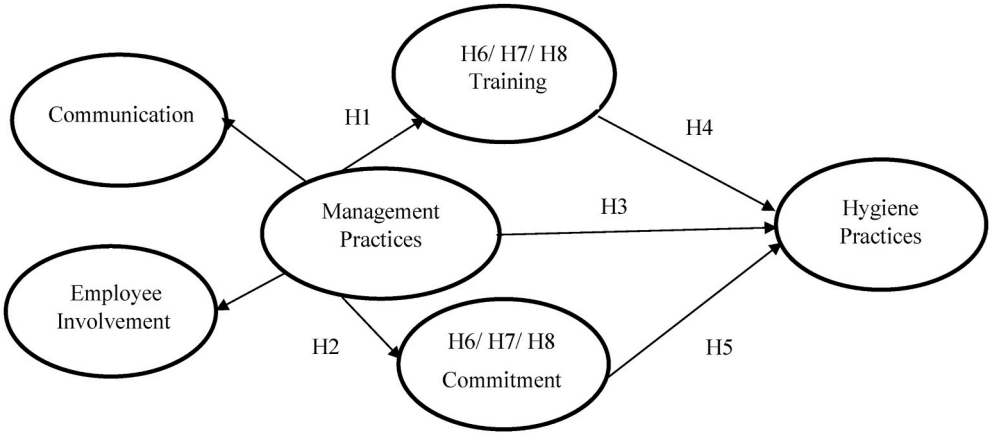

Fig. 1. Proposed conceptual model among management practices and hygiene practices through the mediators training perception and commitment.

Table 5
Association between hygiene practices agree responses and socio-demographic characteristics of food handlers in food establishments in Dubai, UAE.

Demographical characteristics	Hygiene practices agree response mean	Hygiene practices agree response percentage	*P*-value
Education Level	3.75[a]	75.0	0.006*
Elementary	4.00[c]	80.0	
Middle School	3.88 [abc]	77.6	
High School	3.92 [bc]	87.5	
Higher education (>12 years)			
Age	3.75	75.0	0.988
<30 years	3.94	78.7	
30–40 years	3.93	78.5	
>40 years			
Experience	3.75[a]	75.0	0.006*
<6 years	3.94[b]	78.7	
6–11 years	3.93 [bc]	78.5	
≥12 years			
Gender	3.89	77.7	0.707
Male	3.91	78.1	
Female			

* Means with different letters in the same column are significantly different at <0.05.

3.2. Structural model

Constructs of communication, employee involvement, training perception, commitment, hygiene practices were used to develop the structural model in this study and were used to test the proposed hypotheses (Fig. 2). The results from the structural model depicted that the data fit well as presented in (Table 6).

The results retrieved from the SEM test showed that all the hypotheses were supported. Critical ratio was more than 1.96 and showed that there were strong relationships ($P < 0.01$) between management practices and training perception, management practices and commitment, management practices and hygiene practices, training perception and hygiene practices, and commitment and hygiene practices. In summary,

Table 6
Measurement results of fit indices of the structural model.

Fit indices	Model value	Accepted value	Reference
χ2/df	4.8	$\chi 2/df \leq 2$	Ullman (2001)
		$\chi 2/df \leq 5$	Schumacker and Lomax (2004)
RMR	0.08	RMR ≤ 0.08	Browne and Cudeck (1993)
CFI	0.903	>0.90	Byrne (2010)
TLI	0.901	>0.90	Bentler (1990); Byrne (2013)
IFI	0.904	>0.90	Bentler (1990); Byrne (2013)
RMSEA	0.059	<0.10	Bentler (1990); Byrne (2013)

that management practices do have a significant and positive relationship with training perception and commitment of food handlers. It was also observed that commitment and training perception of food handlers had a positive relationship with their hygiene practices (Fig. 2).

Table 7 shows that training and commitment act as partial mediators ($P < 0.01$) in the relationship (direct and indirect) between management practices (employee involvement and communication) and the hygiene practices of food handlers. This means that the management practices (employee involvement and communication) might not affect the hygiene practices of food handlers without existence of training perception and commitment effectively in the establishments.

4. Discussion

4.1. General discussion

Undoubtedly food safety is a very important factor to customers, managers of food businesses and the government health care sector (Taylor et al., 2015). Inappropriate food handling practices at food establishments results in foodborne outbreaks (Greig, Todd, Bartleson, & Michaels, 2007; Sabbithi et al., 2017).

In past studies, many researchers indicated that food safety knowledge and attitudes have significant effect on food handling practices. However, there are controversial findings about the effect of food handlers' knowledge and attitude on the practices (da Cunha, de Rosso, Pereira, & Stedefeldt, 2019; Zanin et al., 2017).

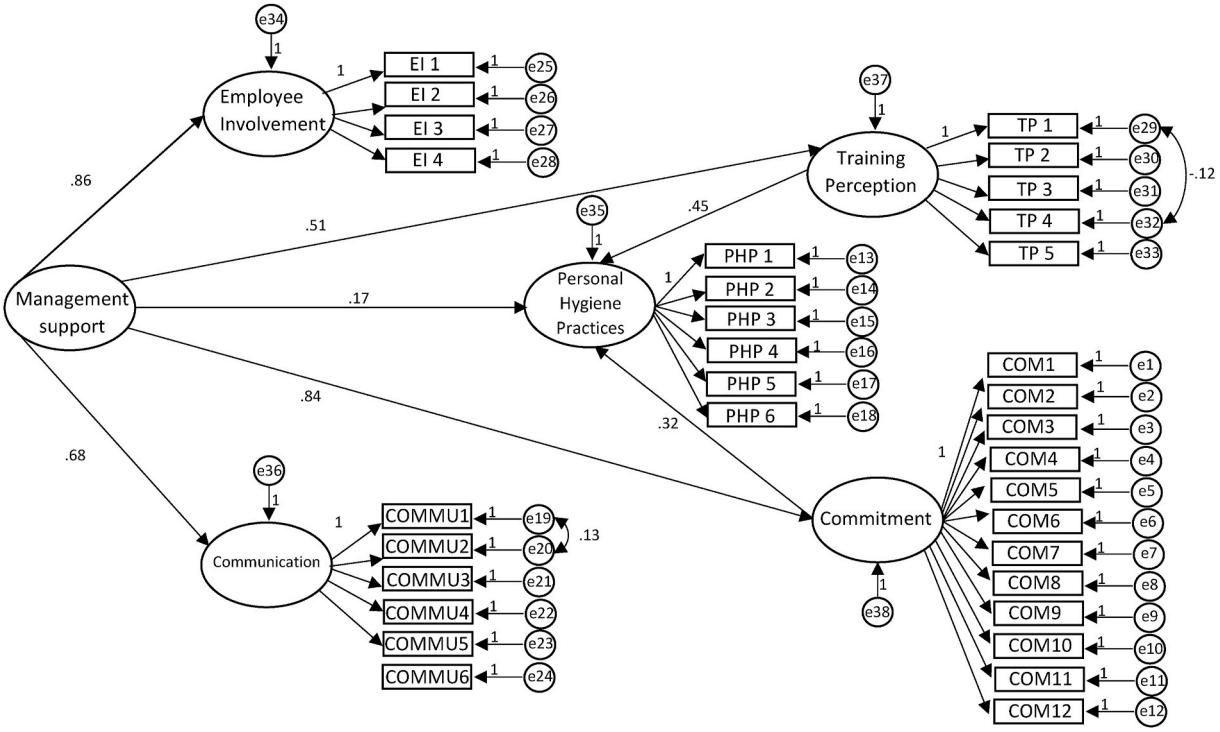

Fig. 2. The structural model of commitment, communication, training perception, personal hygiene practices, and employee involvemen

Table 7
Mediation test results (with training perception/commitment as the mediating variables).

H	Relationship	Mediator	Standardized direct effect	Standardized indirect effect	Mediation result
H6	management Support to hygiene practices	Training perception/Commitment	0.169**	0.405**	Partial
H7	Employee Involvement to hygiene practices	Training perception/Commitment	0.078**	0.384**	Partial
H8	Communication to hygiene practices	Training perception/Commitment	0.150**	0.372**	Partial

** $= P < 0.01$.

Recently, food safety research has focused on soft aspects of management (Nayak & Waterson, 2017; Yiannas, 2009; De Boeck, Jacxsens, Vanoverberghe, & Vlerick, 2019; Fujisaki, Shimpo, & Akamatsu, 2019). These studies contemplated human route aspects (i.e., behaviors, values, beliefs and perceptions) and technical-management aspects (Nanyunja et al., 2015). The human route incorporates people-management principles into food safety more than investigating only knowledge, attitudes and practices model that looks unproductive (Zanin et al., 2017). Consequently, researchers look for innovative strategies because traditional strategies such as diagnostic evaluation through checklists and training applications are not adequate to stimulate the proper handling of food (de Andrade et al., 2021; Zanin et al., 2017).

Communication and safety training are predictive factors of failures and unsafe behaviors in the organization (Clarke, 2006). A perception of suitable safety climate such as communication and training positively affects the professionals' behavior (Amponsah-Tawaih & Adu, 2016); food handlers feel more inspired to accomplish appropriate safety behaviors (de Andrade et al., 2020).

The results of this study show that food handlers had good hygiene practices (78%). It is close to previously published data on food handlers in Kuwait and Brazil (82 and 76%, respectively) (Al- Kandari et al., 2019; Rebouças et al., 2017). It is lower when compared to food industries in the UAE (93%) (Taha, Osaili, et al., 2020) but higher when compared to Ghana (52%) (Kunadu, Ofosu, Aboagye, & Tano-Debrah, 2016).

The commitment of food handlers in this study was 80% which is lower than that of studies conducted previously in the UAE (91.9%) and USA (93.4%) (Taha, Wilkins, et al., 2020; Fatimah et al., 2014). Employee involvement, communication, and training perception results were 71%, 70%, 68%, respectively, which were lower than results reported previously in the UAE (88, 95, and 87%, respectively) (Taha, Wilkins, et al., 2020). The differences between the findings of this study and previous studies could possibly be due to the variance in survey questions, survey protocols, and the respondent demographic characteristics. The association between gender and hygiene practices of food handlers was insignificant ($p > 0.05$). This was expected as they work in the same working environment. Similarly, no significant relationship between age and hygiene practices of food handlers was observed if it is not combined with other factors (e.g., education or experience). Nevertheless, there were significant associations between the level of food handler education and application of hygiene practices. Food handlers with high level of education may have had opportunities to obtain food safety knowledge easily from their colleagues, supervisors, and food inspectors which they translate into hygiene practices. Moreover, food handlers with $\geq$12 years of experience may have participated in food safety training sessions which improved their hygiene practices. These findings were similar to previous studies conducted on food handlers in UAE (Taha, Osaili, et al., 2020) and Jordan (Osaili, Al-Nabulsi, & Krasneh, 2018).

Griffith and Redmond (2009) reported that training does not necessarily result in hygienic food handling behaviors. While several studies have focused on the significance of food safety training (Bashir & Long, 2015; da Cunha et al., 2015; Elnaga & Imran, 2013; Hanaysha, 2016), only a few studies have analyzed the reasons for unhygienic food handling behaviors (Fatimah et al., 2014; Mitchell et al., 2007; Pragle et al., 2007; Yiannas, 2009). This study observed that food handlers were not adequately motivated to be committed to their job. In addition, it reaffirmed that training does influence the dedication of food handlers to a great extent; it guides and encourages their actions towards good hygienic practices.

The findings are consistent with the results of earlier conducted studies (Aladwan, Bhanugopan, & Fish, 2013; Bashir & Long, 2015; Hanaysha, 2016; Woh et al., 2016) that observed training influences commitment, behavior and performance of employees. Care should be taken to educate food handlers about the practical aspects of safe handling besides the theoretical scientific knowledge.

The results of this study show that in addition to providing better working conditions, management may need to improve employee involvement through training, engagement in the decision-making process. Thereby leading the food handlers to respond to ideas for a better working environment.

In addition, the findings also show that the employee involvement does have a strong impact on the commitment of food handlers. The results are consistent with other studies which found that employee involvement is needed to ensure food handlers have a deeper introspection about problems and they can actively take part in the decision-making of corrective actions required for improvement. In this way, food handlers feel more valued in their work environment. Such management practices will result in increased commitment of food handlers towards food safety (Kuuml et al., 2011; Sinha, Garg, & Dhall, 2016; Wilkins et al., 2017).

Communication between managers and employees is always desirable in any working condition, particularly an effective two-way communication (Sharma & Dhar, 2016). The results in our study show that this relationship was statistically significant ($p < 0.05$). Usually managers use a bottom-up communication style to determine the attitude/perceptions of food handlers and to obtain suggestions for work enhancements. However, educating and motivation of food handlers can be achieved by using a top-down communication (Griffith, 2014; To, Martin, & Yu, 2015; Yiannas, 2009). Recent researchers stated that communication, as a part of food safety culture, positively affects food safety practices (de Andrade et al., 2020; Silva et al., 2021; Zanin et al., 2021).

Subsequently, effective and efficient communication between management and food handlers may also have a positive impact on the compliance of food handlers in terms of desired behaviors, procedures and practices. Better communication may lead to better coordination, better cooperation, and better compliance. (3BCBC) (Taha et al., 2020).

Different kinds of media such as "videos, newsletters, meetings, site visits and posters" may be used by the management to create an appropriate channel of communication with food handlers (Bust, Gibb, & Pink, 2008; Nayak & Waterson, 2017). Posters and signs could be placed at sites where food handles would see them the most.

In addition, the results indicate that encouragement from the management has a direct effect on commitment and proper hygiene practices of food handlers. The findings of previous studies (Simosi, 2012; Wilkins et al., 2017) are consistent with our finding. When employees feel that their employers fulfill their needs, their commitment would be enhanced, and they would feel valued at the same time. Thus, management support is a significant factor that contributes to organizational commitment.

Our results revealed that the committed food handlers follow appropriate hygiene practices. These findings are in line with previous studies that confirmed the importance of organizational commitment to

employees and its effect on improving organizational performance (Taha, Wilkins, et al., 2020; Azeem & Akhtar, 2014; Hanaysha, 2016; Sharma & Dhar, 2016; Srivastava, Jaiswal, & Dhar, 2014).

Workers may show behaviors desired by management on the basis of reciprocity when they have a strong commitment (Bashir & Long, 2015, Kanyurhi & Bugandwa Mungu Akonkwa 2016). Thus, the management needs to discover the practices that satisfy employees and those that increase their commitment level to good hygienic practices. Furthermore, the employees also would expect their employers to practice an effective two-way communication, train them properly, give them respect and praise, and involve them in decision-making on a regular basis.

4.2. Practical implications

Restaurant owners and managers should focus on management support practices that affect food handlers' commitment toward personal hygiene practices positively. Training providers should incorporate management practices and commitment in the training materials of mangers and food handlers. Furthermore, the results of the study might be useful to food control authorities to consider management support practices in their inspection/audit protocols.

4.3. Theoretical implications

Many studies have been conducted based on Theory of Planned Behavior (TPB) to evaluate the KAP model. The KAP model considers knowledge a precursor to employees' attitudes which affects their practices. However, many of these studies have shown that the obtained knowledge is not translated into hygiene practices. This study investigated the influence of two keys of management practices on food handlers' commitment and training perception to execute hygiene practices.

4.4. Limitations

Notwithstanding the original and significant contributions that this study makes to the existing literature, some limitations exist. The respondents might not provide answers that show themselves and their restaurants in negative manner.

5. Conclusion

It was revealed that appropriate training perception and food safety commitment have a positive influence on the hygienic practices of the food handlers. Having food handlers with high level of commitment and proper food safety training perception would positively assist management to ensure that hygienic practices truly in place. Management practices such as maintaining effective communication with the food handlers and involving them regularly in decision-making along with periodic training will enable food establishments in maintaining good hygienic practices. Food safety management should focus on driving the commitment of food handlers in order to achieve better business. This study also demonstrates the significance of employee commitment and training in directing the behavioral attitude (intention) towards maintaining good hygiene during the work processes.

CRediT authorship contribution statement

Sadi Taha: Methodology, Data Collection, Writing – original draft. **Tareq M. Osaili:** Methodology, Writing – review & editing. **Mohit Vij:** Software. **Anu Vij:** Writing – review & editing. **Eslam Alhogaraty:** Visualization, Data curation. **Ghassan AL-Utaibi:** Visualization, Data curation. **Ahmad Albloush:** Writing – review & editing. **Abdelrahim Nassoura:** Validation. **Om Prakash Bohra:** Conceptualization. **Sultan Altaher:** Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.foodcont.2021.108313.

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