



Keep them coming back: The role of variety and aesthetics in institutional food satisfaction



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ABSTRACT

Institutional food service settings can deliver higher levels of support for healthy eating; yet institutional food outlets are not a customer favorite. Changing food service provisioning within institutional settings is likely to create expectations for a more enjoyable experience and improve diner satisfaction, which in turn can foster increases in attendance. This study modified the food servicescape in a military dining setting, by changing the physical setting (or servicescape), variety and presentation of foods, and examined the impact of changes on customer satisfaction. Using a cross-sectional pretest/posttest survey design with ($n = 421$) diners, followed by modelling with PLS-SEM, a strong relationship was found between food variety and satisfaction; and a moderate relationship between facility aesthetics and satisfaction. These predictors explained 58% of variance in satisfaction. This study shows how diner satisfaction can be improved in institutional food service outlets; providing a demonstration of the impact of food servicescape changes in a real-world institutional food setting.

1. Introduction

Military dining facilities fall into the category of institutional food services—along with hospitals and schools—which are often subject to negative opinions from consumers (Edwards, 2013). The institutional food sector is characterized by limited and/or subsidized funding; centralized mass production; standardized cyclical menus; recommended nutrition guidelines; self-service, cafeteria or counter presentation; functional layouts and décor; and a stable consumer ‘market’ (Edwards & Hartwell, 2009). Across the institutional sector, these constraints produce a food service that is considered by consumers to be of a lower standard than that served in non-institutional settings (Edwards, Meiselman, Edwards, & Lesher, 2003). Military provided meals have been found to be less preferred (Cardello, Bell, & Kramer, 1996), with outlets such as restaurants, cafés and takeaway shops considered more appealing and viewed as a social outing (Jallinoja et al., 2011). However, these commercial outlets have been shown to provide a lower level of support for healthful eating than military dining facilities (Carins & Rundle-Thiele, 2014).

In Australia, military dining facilities (or messes) are required to provide meals that are nutritionally balanced, on aggregate, to meet the nutritional requirements of personnel (Department of Defence, 2018). Foods are procured according to ‘scales of provision’, to ensure

sufficient and appropriate foods are available to allow personnel to meet their energy needs. The scales ensure a balance of macronutrients and the presence of vital micronutrients. Combined with recommended main meal serving practices, these scales aim to ensure a complete and balanced diet can be achieved through delivery of a wide variety of cooking methods, which mandate the provision of vegetarian and low-fat main dishes; carbohydrate-rich sides (potato, rice or pasta); minimum provisioning guidelines for the numbers of fresh vegetables, salads and fruit choices to be available during a meal; and directing that a variety of breads be available (Department of Defence, 2018). Providing nutritionally balanced food services for military personnel is an important part of ensuring military readiness for duty. Nutrition provides protective health benefits for personnel and supports the individual to perform at the highest level possible (Deuster, Weinstein, Sobel, & Young, 2009). Although policy and standards ensure nutritionally balanced provision, personnel only benefit when they attend the dining facility and choose healthful items from the menu.

Taken together, research indicates that institutional food service settings can deliver higher levels of support for healthy eating; yet institutional food outlets such as messes are not preferred by customers. In order to increase healthy eating in military settings improvements based on consumer preferences may be key. In the non-institutional restaurant or dining sector, factors that affect diner satisfaction have

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been grouped into food-related factors (which includes availability, variety and presentation), service-related factors (such as quick service and attendant helpfulness) and atmospheric factors (including physical aspects of the dining setting) (Mattila, 2001; Namkung & Jang, 2008; Ryu & Han, 2010). Improvements to military dining food services that result in increased diner satisfaction will generate repeat patronage (Kim, Ng, & Kim, 2009), resulting in regular consumption of the nutritionally balanced food offerings.

Poor attitudes toward institutional foods is primarily caused by poor physical dining settings, limited food variety and poor food presentation (Cardello et al., 1996). These factors create expectations for what will be experienced, which has a bearing on the subsequent assessment of the experience which shifts in the direction of the expectation (Piqueras-Fiszman & Spence, 2015). According to expectation assimilation theory (a cognitive dissonance theory), consumers adjust their evaluation of a product or experience to ensure it is not too distant from their expectations (Anderson, 1973), to avoid the psychological discomfort created by the mismatch. Therefore, if consumers have formed low expectations of military dining facilities, their satisfaction levels will be negatively influenced by these expectations. This phenomenon has been observed with military foods served in different food service settings, where the food received lower appraisals in the institutional setting compared to restaurant settings, even when the foods were identical (Edwards et al., 2003). This suggests that changes to military food services that create expectations for a better meal will result in higher levels of satisfaction with the food service. This may be achieved by altering the primary contributors to negative evaluations of institutional meals—poor physical dining setting, poor variety and poor food presentation (Cardello et al., 1996).

The physical setting, termed ‘servicescape’ or ‘atmosphere’ includes design, décor, layout, ambience, signs, and symbols (Bitner, 1992; Kotler, 1974). The consumer experiences the physical setting before they see or taste food, and a positive reaction to the setting creates expectations for the service and food that is to come (Ha & Jang, 2010).

Variety (or the absence of variety – monotony) is an important consideration in institutional feeding, as cyclical menus necessitate the rotation of particular dishes, and production and serving methods influence the types and number of dishes that can be served, and the manner in which they are served. The perception of variety (through increased options, or similar options presented in different formats) creates the expectation that a suitable option will be present, and reduces frustration of choosing among very similar options where the benefits of one over the other are unclear (Mogilner, Rudnick, & Iyengar, 2008). Food presentation is considered to be a major influence on customer satisfaction in dining settings (Namkung & Jang, 2007), and creates expectations for a pleasurable eating experience. Foods that are presented well are considered to be more flavorful and are liked more compared to when they are presented in less attractive ways; when served in naturalistic dining settings (that is, outside of laboratory or controlled settings) (Michel, Velasco, Fraerno, & Spence, 2015; Rowley & Spence, 2018; Zellner, Loss, Zearfoss, & Remolina, 2014).

Changing the food service within military dining facilities is likely to create expectations for a more enjoyable experience and improve diner satisfaction, which in turn generates repeat attendance (Kim et al., 2009). Given this institutional setting is required to provide a menu that is nutritionally balanced, and has been found to offer more support for healthy eating than commercial outlets (Carins & Rundle-Thiele, 2014; Department of Defence, 2018) regular attendance means diners are choosing from a healthier array of offerings. This study examined the impact of servicescape changes made by the catering company on diner satisfaction. Specifically, the catering company changed the physical setting (or servicescape), variety and presentation of foods. The study contributes to the literature in three ways. First, this study demonstrates how diner satisfaction can be enhanced through design innovations in military food settings; it also provides a case of how the food servicescape can be considered holistically during modification; and how the impact of modification to aspects of food service on satisfaction can be measured dynamically (over time).



Fig. 1. Servicescape makeover.

2. Materials and methods

2.1. Research design

The study employed a cross-sectional pretest/posttest survey design. The food service changes included alterations in each of the three areas known to negatively affect evaluations of military foods—the physical setting (or servicescape), variety and presentation of foods (Cardello et al., 1996). The servicescape is considered to be a holistic concept (Bitner, 1992; Kotler, 1974) and many changes could be made individually or concurrently in an attempt to improve consumer perceptions of the setting. Briefly, in this study, the servicescape changes created a brighter, more relaxed atmosphere containing color and decoration and an improved flow during busy times (servicescape); introduced new convenient options at breakfast and lunch and make your own options at dinner (variety); and presented foods in bright decorated counters and packaging for some items (presentation). Changes are illustrated in Fig. 1, and described in Appendix A.

2.2. Data collection and survey measures

The study employed a convenience sampling approach, using an intercept method capturing a subset of diners during meals where the research team was present. This involved approaching diners at random once they had selected their meal and asking if they would fill out a survey during the meal. The protocol was approved by the Griffith University Human Research Ethics Committee and the Defence Science and Technology Low Risk Ethics Panel. Data were collected two months prior to the changes (pre) and one month after the change (post), the timeframe allowed for the practicalities of installing new fixtures, and one month for diners to become accustomed to the new surroundings. Whilst this resulted in data collected over a change of season, the dining room was airconditioned providing a stable, comfortable temperature. The survey was anonymous. The survey captured demographics (age, gender, length of military service), and measures of satisfaction with the dining experience, and perceptions of the dining room aesthetics and food variety. To measure these constructs, we adapted existing multiple-item scales, using three items for satisfaction (Carpenter, 2008), three items for facility aesthetics (Mujahid, Roux, Morenoff, & Raghunathan, 2007) and five items for food variety (Mujahid et al., 2007) (see Appendix B).

2.3. Data treatment

This explored the change in constructs, and the relationships between constructs, and these were modelled using Partial Least Squares Structural Equation Modelling (PLS-SEM) (Ringle, Wende, & Becker, 2015). PLS-SEM is suited to this analysis as the study sought to enhance established theory rather than develop or confirm theory (Chin, 1998). Missing values require imputation before conducting PLS-SEM, and for the current study were imputed using the EM (Expectation-Maximization) method. EM imputations are superior to mean imputations because they preserve the relationship with other variables, which is vital for factor analysis and linear regression (Dong & Peng, 2013). Self-

reported biasness may be inherent in the survey data causing common method variance which could result in inflated relationships between variables (Conway & Lance, 2010). The Harman one-factor test was performed following the method of Yeap, Ramayah, and Soto-Acosta (2016), and revealed the un-rotated single latent factor for the model accounted for less than the cut-point of 50% of variance, which is considered to be the point where common method variance arises (Podsakoff & Organ, 1986).

3. Results

3.1. Sample overview and descriptive statistics

Swipe card records provided by the catering company indicate that mess attendance before and after implementation were similar—usual attendance during the observation period was approximately 600 for a lunch meal and 400 for a dinner meal. A total of 421 diners completed surveys (pre n = 246; post n = 181) during eight meals attended by the researchers (four meals at each of the pre and post time points). Participants were officer-cadets of mixed service (Army, Navy and Air Force) in the first four years of military service. Demographics are shown in Table 1—there was no significant difference between time points in terms of age, length of military service, or proportion of males compared to females; and the majority were within the healthy weight range (determined by body mass index estimated from self-reported weight and height).

Before examining differences in constructs, or testing hypothesized relationships, soundness of the measures must be established. Anderson and Gerbing (1988) recommend a two-stage analytical process where the measurement model (validity and reliability of the measures) is first examined, followed by the examination of the structural model (testing the hypothesized relationship) (Hair, Hult, Ringle, & Sarstedt, 2014).

3.2. Examination of the measurement model

Analysis was conducted using a bootstrapping method of 5000 re-samples which is recommended by Hair et al. (2014). The measurement model was assessed through measures of indicator reliability, convergent reliability, internal consistency and discriminant validity and the results are shown in Table 2. All reflective indicator loadings within the model were more than 0.50 demonstrating indicator reliability (Hulland, 1999, p. 198). Cronbach's alpha was used to determine scale reliability finding all constructs exhibited unidimensionality exceeding the recommended value of 0.70 (Nunnally, 1978). Average variance extracted (AVE) was calculated to assess convergent reliability, finding all latent constructs achieved adequate convergent reliability with AVE values exceeding 0.5 (Bagozzi & Yi, 1988; Fornell & Larcker, 1981). Internal consistency of constructs was assessed using Dhillon-Goldstein Rho (also known as the Composite Reliability (CR), ρ), with all constructs demonstrating adequate convergence or internal consistency with composite reliabilities of 0.7 and above (Gefen, Straub, & Boudreau, 2000). For formative measures, standardized beta weights (Diamantopoulos & Winklhofer, 2001), t-Values (Peng & Lai, 2012), and variance inflation factor (Cassel, Hackl, & Westlund, 1999) are

Table 1
Sample demographics.

Group	Age (yrs) Mean (sd)	Service Length (yrs) Mean (sd)	Gender Number (%)	BMI Mean (sd)
Pre n = 246	20.44 (1.75)	1.64 (1.19)	Male: 191 (79%) Female: 50 (21%)	23.85 (2.49)
Post n = 181	20.16 (1.80)	1.50 (1.08)	Male: 138 (84%) Female: 27 (16%)	23.64 (2.63)

There was no significant difference between pre and post groups age, service length, gender or BMI.

Table 2
Full measurement model.

Construct	Item	Scale	Loadings/ Weights ^a	AVE/t- values ^b	CR/VIF ^c	Cronbach Alpha ^d
Satisfaction	SAT1	Reflective	0.952	0.902	0.965	0.946
	SAT2		0.949			
	SAT3		0.948			
Facility Aesthetics	PE1	Reflective	0.876	0.812	0.928	0.884
	PE2		0.909			
	PE3		0.917			
Perceived Food Variety	FV1	Formative	0.034	0.307	1.48	-
	FV2		0.207	2.092**		
	FV3		0.116	1.491		
	FV4		0.419	5.724**		
	FV5		0.467	7.23**		

^aReflective: All Item Loadings > 0.5 indicating indicator reliability; Formative: Standardized beta weights.

^bReflective: All Average Variance Extracted (AVE) > 0.5 indicating convergent reliability; Formative: t-values > 1.96.

^cReflective: All composite reliability (CR) > 0.7 indicating internal consistency; Formative: Variance Inflation Factor < 5.

^dAll Cronbach's alpha > 0.7 indicating indicator reliability; No Cronbach alpha needed for Formative constructs.

taken into consideration, in this case for the indicators of perceived food variety. Items FV1 and FV3 were not significant indicators ($p > 0.05$) of perceived food variety.

Discriminant validity is the degree to which measures of different constructs are distinct, and not highly correlated with measures of other latent constructs. Discriminant validity for both formative and reflective constructs was tested using the cross loading criterion (Chin, 1998), finding the highest loadings for each item on the construct in which it belongs. The results of testing with Fornell and Larcker (1981) criterion and the heterotrait-monotrait (HTMT) ratio of correlations (Henseler, Ringle, & Sarstedt, 2015) indicate that the respondents are able to understand and discriminate between the different constructs (Table 3).

3.3. Differences in measures before and after servicescape modification

Once validity and reliability of constructs had been established, independent samples t-tests were used to determine if the construct means differed between time points. The means for all constructs were significantly higher after the food service changes, indicating more positive ratings of the dining service room aesthetics, food variety and satisfaction after the servicescape modification (see Table 4).

3.4. Examination of the structural model

The conceptual model provided a high level of explanation of variance for satisfaction ($R^2 = 0.582$) (see Fig. 2). Relationship testing

Table 3
Discriminant validity.

	Fornell & Larcker ^b		HTMT ^c	
	PE	SAT	PE	SAT
PE: Facility Aesthetics	0.901			
SAT: Satisfaction	0.653	0.950	0.709	

^aDiagonals (bolded) represent the square root of the AVE; off diagonals represent the correlations (reflective measures).

^bAVE of a latent variable should be higher than the squared correlations.

^cValues are significantly different from 1 indicating achievement of discriminant validity.

uncovered significant relationships between perceived food variety and satisfaction ($\beta = 0.475$, $p < 0.01$) and facility aesthetics and satisfaction ($\beta = 0.385$, $p < 0.01$), indicating a substantial model where the predictors contribute to the variance explanation of the respective dependent variable (Cohen, 1988). Both the substantive significance (effect size) and statistical significance (p-value) were considered (Sullivan & Feinn, 2012), finding the relationship between availability and satisfaction had a large effect size, with medium predictive relevance; whereas the relationship between facility aesthetics and satisfaction had a medium effect size, with small predictive relevance (see Table 5). The Standardized Root Mean Residuals (SRMR) of the model (0.042) further indicates that the theoretical model application is appropriate for this research as well as the data and the model for this research is a good fit (Henseler et al., 2015).

3.5. Multi group analysis

Post-hoc tests examined whether the constructs and relationships differed between the group surveyed before the food service changes, and the group surveyed after the changes. Independent samples t-tests were used to determine if the construct means differed between time points, and Multi Group Analysis (PLS-MGA) was used to determine if there were any significant differences between the path coefficients of the same model for two distinct groups (Henseler, Ringle, & Sinkovics, 2009; Sarstedt, Henseler, & Ringle, 2011). Although the means for all constructs were significantly higher after the servicescape changes (refer back to Table 4), the paths did not differ significantly between the groups. The path from perceived food variety to satisfaction was similar before and after (pre $\beta = 0.358$, post $\beta = 0.303$; $t = 0.521$, $p = 0.303$) as was the path between aesthetics and satisfaction (pre $\beta = 0.493$, post $\beta = 0.516$, $t = 0.125$, $p = 0.553$) indicating a stable relationship for the role that food variety and aesthetics have on satisfaction.

4. Discussion

This study contributes to the literature in three ways—demonstrating how diner satisfaction can be improved in a military food service setting; evaluating a food servicescape change that delivered simultaneous changes in aesthetics and food variety; and measuring the impact of aspects of food service on satisfaction dynamically (over time). Each of these contributions are discussed in turn.

4.1. Changing the institutional food servicescape

Lower diner satisfaction in institutional settings (compared to other food service settings), including military dining settings has been established (Cardello et al., 1996; Edwards et al., 2003). To date studies attempting to demonstrate improvements to diner satisfaction in institutional settings following servicescape changes are not available. Diner satisfaction has been measured following modifications to military food services (Belanger & Kwon, 2016; Cole et al., 2018; Crombie et al., 2013), however these modifications centered on food provision, menu standards and nutrition information or labelling; and measures concentrated on diner satisfaction with these aspects and did not include consideration of the broader servicescape (as defined by Bitner, 1992; Kotler, 1974). This study examined the relationships between changes to food variety, aesthetics and their impact on satisfaction in a military dining context, finding a strong relationship between food variety and satisfaction (a large effect size, with medium predictive relevance); and a moderate relationship between facility aesthetics and satisfaction (a medium effect size, with small predictive relevance). These predictors explained 58% of variance in satisfaction. Using a pre-post survey design, the effects of changes to the military food service were examined—specifically servicescape remodeling, increased variety and presentation of foods—finding the relationships held, and

Table 4
Comparison of measures before and after servicescape modification.

Constructs ^a	Mean (SD) pre	Mean (SD) post	Difference	t	p
Satisfaction	4.112 (1.62)	5.094 (1.16)	0.982	7.305**	< 0.001
Perceived Food Variety	3.770 (1.25)	4.513 (1.17)	0.744	6.226**	< 0.001
Facility Aesthetics	3.993 (1.49)	5.416 (1.02)	1.423	11.678**	< 0.001

**p < 0.01, *p < 0.05.

^aAll constructs in the model were significantly higher after the changes.

that diner satisfaction was higher after the changes. Diners rated the dining service room aesthetics and food variety more positively after the changes. The effects of servicescape elements on pleasure and satisfaction have been demonstrated in dining environments (Heung & Gu, 2012; Lin & Mattila, 2010), with servicescape shown to be an indicator for the expected service quality, as well as an influence on the evaluation of other aspects of the service (Reimer & Kuehn, 2005). The setting matters—when presented with identical foods in different settings, consumers report differing levels of expectations for an enjoyable experience, and satisfaction with the experience afterwards (Cardello et al., 1996; Edwards et al., 2003; Meiselman, deGraaf, & Lesher, 2000). Consumers use expectations as a reference point against which the ensuing experience is compared (Zeithaml, Berry, & Parasuraman, 1993) and assessments of the experience tend to move in the direction of the expectation (Piqueras-Fiszman & Spence, 2015). Modifying military servicescapes to more closely represent non-institutional dining settings (such as cafes and restaurants) evokes an expectation for a dining experience that matches those settings, which are considered to offer a higher standard of food service (Cardello et al., 1996). In this study, modernizing the military dining servicescape to reduce the ‘institutional’ look resulted in improved dining room aesthetics scores. Increased aesthetic ratings in turn, positively influenced diner satisfaction. Given satisfaction has been linked to return patronage and positive word-of-mouth (Kim et al., 2009), an improved military dining servicescape may mean personnel repeatedly come back for nutritious meals and encourage others to join them.

Providing greater variety within this context can also increase satisfaction. Consumers seek variety, to provide stimulation, avoid satiation and to allow for an active choice process through consideration of alternatives (Kahn & Ratner, 2005). However, too much choice can be overwhelming, and can lead to dissatisfaction (Chernev, 2003; Iyengar & Lepper, 2000). One study determined an ideal number of six menu choices for fast service restaurants and seven to ten menu choices for fine dining establishments (Johns, Edwards, & Hartwell, 2013) which aligns with studies in other product categories indicating an ideal range of five to six choices (Iyengar & Lepper, 2000; Mogilner et al., 2008; Sela, Berger, & Liu, 2008). Furthermore, consumers’ satisfaction

with dishes diminishes when there is little variety over time. Repeated exposure to the same dishes or flavors, over a period of days or weeks, results in decreased liking for those products (Meiselman et al., 2000; Zandstra, de Graaf, & van Trijp, 2000). However, it has been suggested that satisfaction may be more dependent on the degree of difference between the items (perceived variety) than the actual number of items available (Mogilner et al., 2008). Therefore, when similar foods are presented in different formats, more variety is perceived to exist. By introducing options in different formats (prepacked sandwiches instead of sandwich ingredients; and prepacked salads instead of selecting from the buffet; make your own dinner instead of pre-made in the bain-marie) more variety was introduced in this facility. At lunch, the new option resulted in an increase to the number of options available (increased variety through increased number of choices) but at dinner the new option was added with concurrent removal of one main choice (perceived increase in variety through use of different formats). Both together indicate to the consumer an increased likelihood that a suitable option meeting their needs and desires will be found. In this study, greater variety was perceived following the changes even though the number of options offered was marginally different, and this increased perception of variety had a positive impact on satisfaction. Given the health and performance benefits of a nutritionally balanced diet, consuming meals in a setting that provides meals according to nutrition standards will benefit personnel—and improving satisfaction will keep them coming back regularly.

4.2. Considering the food servicescape holistically during modification

The impact of changing aspects of the atmosphere or servicescape has been studied individually (e.g. odour, c.f. Guéguen & Petr, 2006; and music, c.f. Wilson, 2003); yet consumers experience and evaluate the restaurant servicescape holistically (Lin & Mattila, 2010). Numerous studies have examined the impact of servicescape aspects jointly on consumer satisfaction, intention and loyalty in food services (Ha & Jang, 2010; Heung & Gu, 2012; Kim et al., 2009; Ryu & Han, 2010); the fitness industry (Ong & Yap, 2017) and during sporting experiences (Fernandes & Neves, 2014), however, studies examining impact of

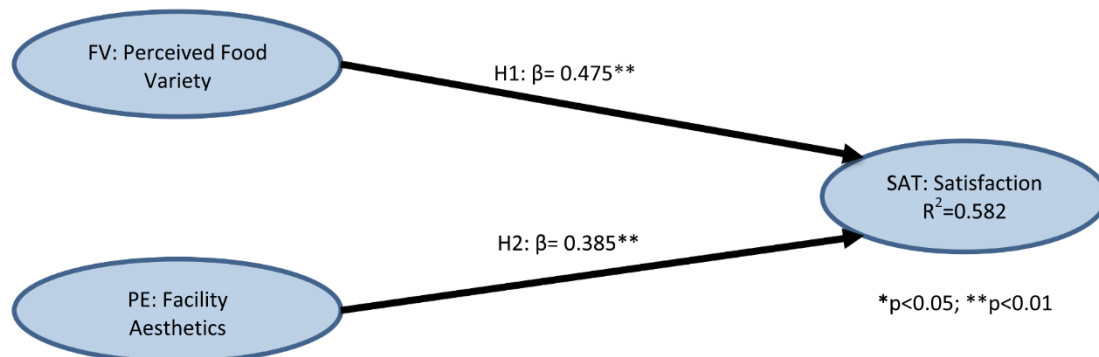


Fig. 2. Final model result.

Table 5
Structural model hypothesis testing.

Hypothesis	Relationship	Std Beta	Std Error	t-value	Decision	f ²	q ²	95%CI LL	95%CI UL
H1	Perceived Food Variety -> Satisfaction	0.475	0.481	10.007**	Supported	0.356	0.232	0.403	0.557
H2	Facility Aesthetics -> Satisfaction	0.385	0.382	7.884**	Supported	0.220	0.148	0.303	0.461

**p < 0.01, *p < 0.05.

R² (Satisfaction = 0.582); Effect size impact indicator f² values: 0.35 (large), 0.15 (medium), and 0.02 (small).

Q² (Satisfaction = 0.479); Predictive relevance of predictor exogenous latent variables q² values: 0.35 (large), 0.15 (medium), and 0.02 (small).

changes to an entire servicescape in a real world setting are rare (with some notable exceptions: [Bruggen, Foubert, & Gremler, 2011](#) who examined servicescape change in a fast-food setting; [Dagger & Danaher, 2014](#) who examined servicescape change in a shopping context). Calls have been made for further investigation of the effects of more than one servicescape aspect on consumer behavior ([Mari & Poggesi, 2013](#)) and the impact of jointly modifying these aspects on consumer satisfaction and other consumer responses needs to be demonstrated in real world settings to provide evidence to guide practice.

4.3. Examining the impact of food servicescape on satisfaction dynamically

Existing research has predominantly examined the effect of different holistic servicescapes on satisfaction or other consumer responses in a static setting (again with the exceptions noted above: [Bruggen et al., 2011](#); [Dagger & Danaher, 2014](#)), whereas this study examined satisfaction over a period of time in which the servicescape was modified in a military setting. Examining which aspects are associated with, and predictive of, a consumer state (like satisfaction) at a temporally fixed time gives understanding of the forces in play at that time but does not necessarily predict what factors are required to change to produce a shift in the consumer response. The determinants of behavior have been shown to be different to the determinants of behavior change when comparing static and dynamic modelling approaches ([David & Rundle-Thiele, 2019](#)). Adopting experimental designs that test modification of the servicescape and measure the effect dynamically over time will provide understanding of which aspects are required to change to result in beneficial changes in consumer responses.

4.4. Limitations and future research

This field experiment provided an opportunity to examine the impact of food service changes in one real-world institutional food setting, however, the setting presents limitations which represent avenues for future research. First a cross sectional research design was utilized in the current study and differences observed across time may reflect group differences. A controlled longitudinal research design remains the optimal research design that can be employed in future prior to drawing definitive conclusions. Furthermore, follow up at a later timepoint is needed to determine whether initial increases in satisfaction are maintained over the longer term. Changes to the servicescape were made simultaneously and the combined effect of servicescape redesign, variety and aesthetics on changes in satisfaction were modelled in this study. An additive design would permit individual aspects of the servicescape changes to be determined. However, in practice this may be very difficult to achieve given costs to roll out servicescape changes would be significantly higher. Furthermore, the effect of perceived changes in variety (the consumer's perception of an increase in variety produced by different presentations of the same item), and actual changes to variety (produced by increases in the number of items offered) needs to be examined further; given the degree of difference

between the items may be more important than the actual number of items available ([Mogilner et al., 2008](#)). Future studies could incorporate additional variables to tease out the relationship between individual aspects and satisfaction, or different experiments could be used to isolate the effects of each change. Further extensions to this work could examine whether the positive effect reduces after a period of time—research in the fast-food setting demonstrated consumers 'adapt' to a remodel, forming a new frame of reference for expectations, and as a result some positive responses fade ([Bruggen et al., 2011](#)). Monotony is an important consideration in institutional feeding, as diners are attending the same venue regularly, often for more than one meal; therefore, satisfaction with initial changes may fade quickly in comparison to commercial settings. Consideration of individual characteristics (e.g. service, rank, length of time served) can reveal heterogeneity in preferences and future research permitting segmentation of diners would further enhance insights. Finally, this study did not examine whether the increased satisfaction resulted in return patronage or positive word-of-mouth attracting additional diners; longitudinal studies are needed to explore these additional aspects. Furthermore, it is assumed when diners visit dining facilities with standards in place to ensure nutritionally balanced provision that healthful eating will result. Future investigation needs to examine whether this is the case.

5. Conclusion

Institutional food service settings support healthy eating by designing menus according to nutritional standards, yet these venues are generally considered inferior to commercial outlets. Modifying food service provisioning within institutional settings can create expectations for a more enjoyable experience, improve diner satisfaction, and in turn encourage diners to attend regularly. This study provides a real-world case of how an institutional food setting can be modified resulting in improved diner satisfaction. This provides evidence to guide managers of these settings to make positive changes to their food services, as well as a demonstrating how altering the primary contributors to negative evaluations of institutional meals can be turned around to improve satisfaction, and ultimately keep them coming back.

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

Aspect	Before	After
Servicescape	<p>Dark brown plastic topped tables with black metal legs. Burgundy vinyl padded chairs with plastic legs. Each square table seated 12, and tables were arranged in a structured grid format.</p> <p>Diners entered the dining room from the left or right, swiped their card, took a dining ticket, and proceeded to the servery room where all food offerings were in buffet-style counters. Queues often formed as there was only one entry to the servery room. Once inside the servery room, diners filed by the hot servery, then the salad servery, and the sandwich bar, before exiting out into the main dining room. The drinks station (also the cereal/toast area for breakfast, and location of the sandwich toasters) was positioned just outside of the servery room—diners filled a drink before taking a seat at a table. Little to no room decoration. Food counters were unmodified standard stainless steel.</p>	<p>Timber topped tables (combination of light & mid coloured timbers) with light grey metal legs. Light grey padded chairs with silver metal legs. Combination of square (4 seat) and rectangular (6 seat) tables, arranged casually, some straight, some angled. Some joined together to create tables for larger groups.</p> <p>Diners entered the dining room from the left or right, swiped their card, and took a dining ticket. They could then choose to enter the servery room for hot meals from the buffet OR visit the sandwich bar or the salad bar (both now located outside the servery room) OR the Grab n Go counter created in the dining room. Queues were now rare. The drinks station (also the cereal/toast area for breakfast, and location of the sandwich toasters) remained in the original location, and because the sandwich bar was now located outside the servery, diners could more easily make toasted sandwiches. White slatted screens were used to break up the large dining space. Plants were placed in the room, and colourful fresh food pictures placed on the walls. Modern café signs were hung above each servery.</p>
Variety	<p>All foods were presented in Bain Mariés or buffet counters, and contained 4–5 main choices, 5–6 hot vegetable choices, a number of salad choices, and a variety of sandwich ingredients.</p>	<p>Existing buffet options were retained. New options were introduced: A lunch Grab-n-Go option (e.g. a sandwich, wrap or boxed salad; bottle of water and a muffin, in a paper bag). And a dinner make-your-own option (e.g. pizza bases and toppings to assemble and place on a conveyor to pass through a pizza oven). At lunch, the new option was added without the removal of other options (increased number of options) whereas at dinner the new option was added with concurrent removal of one main choice (same number of main options). Each option introduced variety in terms of preparation/service (no assembly/selection in the Grab-n-Go and self-assembly/cooking in the make-your-own)</p>
Presentation	<p>Foods in the buffet counters were accessible only from one side. Vision and access to the back of some counters involved bending and reaching. Food counters were unmodified stainless steel counters, and presentation within counters was uniform (e.g. each item/dish was presented side by side in the stainless steel or black plastic inserts)</p>	<p>Salad and sandwich counters were now accessible from both sides and located in the bright dining room. Food counters were decorated with timber look ‘skins’ and wicker baskets. Grab-n-Go foods (e.g. wraps, salads) were packaged in attractive packages. Make-your-own food ingredients were presented in wooden boxes, wicker baskets, or clear plastic tubs under bright lights.</p>

Appendix B. Survey items

Demographic questions

- What is your birth year? [free text]
- What is your gender? [Male/Female/undisclosed]
- How long have you been a Defence member? [free text]
- What is your height in centimetres? [free text]
- What is your weight in kilograms? [free text]

Construct/items

[All items were presented on a 9-point scale, from ‘Strongly disagree’ to ‘Strongly agree’]

Satisfaction (from Carpenter, 2008)

- SAT1 I am pleased with the dining experience I had in this facility today.
- SAT2 I am happy with the dining experience I had in this facility today.
- SAT3 I am contented with the dining experience I had in this facility today.

Perceived Food Variety (adapted from Mujahid et al., 2007)

- FV1 A large selection of fresh fruits and vegetables is available in this dining facility.
- FV2 The fresh fruits and vegetables in this dining facility are of high quality.
- FV3 A large selection of low-fat products is available in this dining facility.
- FV4 A large selection of quality protein foods is available in this dining facility.
- FV5 A large selection of energy rich products is available in this dining facility (Mess).

Facility Aesthetics (adapted from Mujahid et al., 2007)

- PE1 This dining facility is well-maintained
- PE2 This dining facility is attractive.
- PE3 It is pleasant to be in this dining facility.

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