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Research report

A construct analysis of meal convenience applied to military foods

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Abstract

The present research investigates the concept of food convenience within the institutional framework of military feeding. The approach views food-related convenience in terms of two broad dimensions: "type of convenience" and "timing of convenience." A discrete choice experiment was conducted with US military personnel ($n = 179$) regarding their perceptions of the (in)convenience associated with the use and consumption of low-preparation, all-in-one, military meals (MREs—meals, ready-to-eat). The obtained data strongly suggest that perceived (in)convenience, time and effort are separate constructs. A food provisioning process perspective was captured in the "timing of convenience" dimension, and the contribution of different stages in the consumption process to the perceived convenience of the meal situation was empirically demonstrated. The latter result has important implications for the study of food convenience outside this specific population and context. As opposed to the product perspective that is currently predominant in the literature, it demonstrates the necessity of adopting a meal perspective in analysing food-related convenience.

Keywords: Meals; Military feeding; Time; Effort; Food provisioning process; Type of convenience; Timing of convenience; Discrete choice experimentation

Introduction

Throughout the Western world evidence of consumer demand for convenience is omnipresent (e.g., Berry, Seiders, & Grewal, 2002; Brown, 1990). Large retail locations enabling one-stop shopping, availability of non-food items in grocery shops such as clothing and furniture, as well as telephone and Internet banking are but a few examples. In the case of food, which is the context of the present research, the phenomenon of convenience is equally pervasive (e.g., Mermelstein, 2001; Schmidl, 2000). It is well documented that demand for convenience is an important factor influencing food choice (e.g., Bove, Sobal, & Rauschenbach, 2003; Connors, Bisogni, Sobal, & Devine, 2001; Divine & Lepisto, 2005; Prescott, Young, O'Neill, Yau, & Stevens, 2002; Steptoe & Wardle, 1999) and for many people lack of convenience is a barrier to achieving nutritional intake goals, such as the recommended daily intake of 5+ servings of fruit and vegetables (e.g., Jaeger, 2003; Uetrecht, Greenberg, Dwyer, & Tobin, 1999).

Although research on food convenience has typically focused on foods prepared at home or foods served in restaurant, convenience is also of critical importance to institutional foodservices, where large numbers of consumers must eat meals, under considerable time, environmental and other constraints. Among institutional foodservices, nowhere is the convenience of food more important than in military feeding, where the extreme demands placed on soldiers by physical, psychological, temporal and environmental stressors make the convenience of food and foodservice essential to how much the soldier eats and even whether he/she eats at all. The consumption or non-consumption of military food also has important implications for physiological functioning, mission performance and survival.

Currently, US military field feeding utilises the meal, ready-to-eat (MRE) as its primary operational ration. The MRE is a shelf-stable, lightweight ration designed to be carried and consumed in the field during combat operations and in situations where cooks cannot prepare group

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meals. There are 24 MRE menus in use today and each contains 6–8 individual food items that are centred around a main entrée (Fig. 1).

For military ration planners, one of the most significant problems with the MRE is that they are under-consumed by troops in the field (e.g., Booth, Coad, Forbes-Ewan, Thomson, & Niro, 2003; Meiselman, 1995; Meiselman, Hirsch, & Popper, 1988). This under-consumption can detrimentally impact the physical and cognitive performance of the soldier. Contributing factors to this under-consumption include the sensory quality of the food, its limited variety, and social and negative attitudinal factors (Marriott, 1995). In addition, the (in)convenience of the food can play a significant role.

The multiple steps involved in consuming the MRE in the field have been described as follows: "finding a safe or protected location, finding water, rendering it potable, cleaning oneself, opening ration packages, rehydrating foods and beverages that require it, choosing a heating method, heating those items that one wants to eat hot, and finally eating food items contained in as many as five different packages. … Cleaning up may involve burying or burning trash and cleaning a canteen cup if it was used to heat food or prepare beverages" (Hirsch & Kramer, 1993, p. 225). To the extent that preparing and heating the MRE and cleaning up after eating it are time-consuming, less time remains for soldiers to consume their ration. Since the total time available for feeding in military operations is extremely limited, this reduction in time available to eat can directly affect adequate consumption of the ration. The inconvenience associated with beverage consumption is equally important, because of the likelihood of dehydration with active troops carrying heavy loads in hot and arid environments. Consuming beverages is an effortful task because soldiers must go to a central water dispensing area (water buffalo) to acquire water to mix with their MRE beverage powder. In addition, soldiers must wash their canteen cups following use, further increasing the effort involved with fluid consumption. Thus, the convenience or *in*convenience of consuming the MRE and its associated beverages is an important issue to military nutritionists, product developers, physiologists and performance specialists. Unfortunately, to date, military efforts to improve the convenience of the MRE have focused mainly on improving the human factor aspects of its packaging. Little systematic research has been undertaken on the broader construct of its convenience throughout the entire provisioning/consumption process.

Fig. 1. The meal, ready-to-eat. See Table 1 for further details.

In order to understand and address the issue of the convenience of the MRE or of any food, one must consider what it is that constitutes the construct of "convenience." One recurring element that has appeared in the literature is the perceived "time" associated with preparing and eating the food. This element of convenience has played an important role in "resource constraint" perspectives of convenience. One of the earliest contributions in this tradition was Holton's (1958) analysis of working women who, due to their greater opportunity cost of time, were found to be more sensitive in their perceptions of product convenience than women who worked in the home. Another line of inquiry in the resource restraint tradition has considered the trade-off between household wealth and time. Intuitively, wealthy people should be more willing to buy products and durable household goods that enhance convenience through time saving. Unfortunately, the empirical evidence in support of both of these relationships is mixed (e.g., Darian & Klein, 1989; Kaufman, 1990; Kim, 1989; Reilly, 1982; Strober & Weinberg, 1980).

It has been suggested that empirical inconsistencies such as those outlined above may in part be due to an incomplete specification of the convenience construct. For example, Reilly (1982), Yale and Venkatesh (1986) and Wardle (1999) have criticised the assumption that convenience is a unidimensional construct related to time (i.e., Holton, 1958), and although it is today widely agreed that convenience is a complex and multidimensional construct (e.g., Berry et al., 2002; Darian & Cohen, 1995; Gehrt & Yale, 1993; Gofton, 1995), a consensus on the definition of the convenience construct has yet to emerge. A starting point for moving towards such a consensus is the broad agreement that both time and effort contribute to (in)convenience. Anything that require (1) extra time, such as in preparation or cooking, and/or (2) extra effort (mental and/or physical), such as in making difficult preparation decisions or in performing post-consumption clean-up, reduces perceived convenience (e.g., Berry et al., 2002; Candel, 2001; Cullen, 1994; McCullough, Jones, & Vignali, 2003). With regard to the consumption of MREs by military personnel, Hirsch and Kramer (1993) arrived at a similar conclusion, stating that "whatever makes eating less costly in terms of *time or effort* will result in higher levels of food intake."

The construct of convenience is, however, only partly captured through time and effort, which are components of the dimension of convenience that Darian and Cohen (1995) refer to as "type of convenience." Increasingly, it has been recognised that a second broad dimension is also

of importance, namely that which Darian and Cohen (1995) refer to as the "timing of convenience" dimension: the stage(s) of the consumption process at which convenience is obtained. Scholderer and Grunert (2004) have recently brought this "timing of convenience"/consumption process perspective to the study of food-related convenience. For food, the consumption process is a series of steps known as the food provisioning process (Goody, 1982; Marshall, 1995): planning what to eat, acquiring the food, preparation, cooking, eating, disposal of remnants and tidying up. By incorporating this process perspective as part of the operationalisation of the food-related convenience construct, this approach facilitates a focus on food *in the context of meals*, which is the actual role of food in peoples' lives (Meiselman, 2000). Put simply, people think of food in terms of meals not individual food items—we eat breakfast, not coffee, muesli and toast.

Thus, while a more complete conceptualisation of the convenience construct appears to be emerging, empirical studies testing this framework are scarce. The objective of the present research is to both assess the factors contributing to the perceived convenience/inconvenience of MRE meals, while also furthering the testing of this conceptual framework and facilitating progress towards a more complete specification of the convenience construct.

Methodology

Discrete choice experimentation was chosen as the research methodology to demonstrate that one or more stages in the food provisioning process contribute to the convenience of consuming MRE meals. Further, to address the aspect of the research pertaining to the "type of convenience" dimension, choice experimentation was used in a between-subjects design with three different dependent variables—convenience, time and effort. This enabled a comparison of the models developed with each of these dependent variables and an examination of the equality of the constructs to which they pertain. For the purpose of this research, choice stimuli defining the situation of eating an MRE in the field were developed in accordance with a 2^4 design (Table 1) that manipulated (such that one level was more inconvenient than the other) factors pertaining to the food provisioning process stages of acquisition, preparation, eating and disposal.

In addition to the design shown in Table 1 (Design A), a second design was employed. This design (Design B) used the same procedure and manipulated the same four stages of the MRE meal process, but operationalised them differently (see Table 4). A focus group with regular military users of the MRE was conducted to ensure that both levels of all design factors reflected food provisioning practices that were likely to take place in the field. Thus, in practice, soldiers might actually stand in a queue at a central field location to receive their meal pouch, while at other times boxes of MRE pouches might be brought to dispersed areas where they are handed out individually to soldiers seated on the ground. Soldiers might trade one or more MRE items with other soldiers or they might simply keep what they received. The main ration entrée might be heated for the recommended 10–12 min in a flameless ration heater (chemical heater), for some lesser time, or eaten cold, and the food could be consumed "as is" or kneaded/stirred for more uniformity in texture. Soldiers might choose to prepare the powdered beverage supplied with the MRE or they might simply drink water. Lastly, they might voluntarily clean their own area after eating or be assigned to do so for a larger group of soldiers.

Among the factors in Tables 1 and 4, some manipulated inconvenience predominantly with respect to time and others predominantly with respect to effort. Due to the interdependence of time and effort, it is not possible to manipulate one construct without the other. Therefore, to enable an exploration of the relationship between the constructs of (in)convenience, time and effort, a between-subjects approach was used where choice responses pertaining to each of these constructs were collected separately. Specifically, the 16 choice stimuli defined by a design were grouped into eight choice sets that were used in a between-subjects approach with convenience, time and effort as response variables (i.e., each participant evaluated eight choice sets with respect to only one of these three dependent variables). For each of the eight choice sets a participant evaluated, he/she was directed to evaluate the two MRE meal situations presented in the set and, depending upon the response variable, to indicate which was perceived as "most convenient," "most time-consuming" or "requiring most effort." As there was no evidence during pilot testing that any two choice stimuli were

Table 1
Experimental Design A

Factor	Low	High
Acquisition	Sit down and wait to receive a meal pouch	Stand and wait until receiving a meal pouch
Preparation	Heat the main dish for 5 min	Heat the main dish for 10 min
Eating	Drink some water right out of your canteen	Prepare and drink the powdered beverage drink
Disposal	Take a moment to clean-up your area	Spend 3–5 min cleaning your area

Note: Typically, the form and content of such all-in-one meals is a sealed plastic pouch (approximate size: 25 cm × 30 cm × 7 cm; approximate weight: 1.5 lb) containing a variety of food items including a main dish, a cold drink beverage powder, tea and coffee, some candy, a spoon and a device for heating food items. See Fig. 1.

perceived as equally convenient, time-consuming or effortful, this answer option was not included.

Data were collected from US military soldiers (Army) who were involved in realistic combat training exercises at Ft. Polk, LA (USA). The training exercise resulted in mock fatalities who were evacuated to a remote "mortuary" located in a large, bare warehouse building. Soldiers remained in this building for more than 24 h, before being sent back into the mock battle as "replacements." Soldiers were required to remain in the warehouse and, besides taking part in this study, they could only rest, maintain their equipment or eat MRE field rations like those used in this research. To obtain a representative sample of users, data were collected from two groups of enlisted soldiers and officers ($n = 179$) taking part in the combat training. The groups did not differ significantly in terms of demographic composition, and the demographic profile of the total sample [84% male, 85% enlisted soldiers and with a young age profile (29% aged 18–25 years old, 39% aged 26–39 years old and 32% aged 40 years or older)] was very similar to that of US combat troops in general.

To accommodate the facilities in the "mortuary warehouse," data were collected using a paper-and-pencil survey. To control for any bias due to situational context, the choice experimentation part of the survey began by describing a specific MRE meal situation, relative to which the participants were asked to evaluate the choice stimuli. The scenario read: "You are on a training exercise with your unit. It is dry and 70 °F. You have been marching for 4 h and have just reached a clearing. A 30-min stop is signalled." The choice task relating to Design A (Table 1) was followed by a manipulation check or by choice Design B (Table 4). The survey ended with several attitudinal (not reported) and demographic measures.

For each response variable the choice data were analysed with the multinomial logit model (MNL). Comparable to the overall F test in multiple regression, the chi-square test for the change in $-2 \log L$ value from the base (null) model was used to assess the overall fit of the MNL model and in particular its significance (e.g., Hair, Black, Babin, Anderson, & Tatham, 2006). Using the derived MNL model, the predicted score for each of the 16 stimuli in a design was calculated using the estimated beta-coefficients. As previously described by Jaeger, Hedderley, and MacFie (2001) this enabled an analysis of deviance leading to determination, for the dependent variable of interest, of the relative importance of each factor (expressed as the percentage of total deviance accounted for). To avoid the inverse relationship between convenience, on the one hand, and time and effort on the other, and to facilitate an easier comparison between the MNL models pertaining to the three response variables, choices relating to convenience were converted to inconvenience. Given that choice sets contained two stimuli only, this was simply done by recording the meal situation not chosen as the most convenient. The manipulation check asked respondents to indicate whether one factor level was either much less convenient than the other, equally convenient or much more convenient. The intended factor level was chosen, on average, 85% of the time.

Results

Focus is first directed towards a comparison of the components that make up the "type of convenience" dimension (i.e., perceived inconvenience, time and effort). To provide a backdrop for this comparison, each of the three MNL models are first briefly presented. For inconvenience each of the four food provisioning process stages under study contributed significantly to the model (Table 2). The effects were in the expected directions: (i) standing and waiting to receive an MRE meal was considered less convenient than sitting down; (ii) heating the main dish for 10 min was less convenient than heating it for 5 min; (iii) preparing and drinking the cold beverage was less convenient than drinking water from a cup; and (iv) clearing one's area for 3–5 min prior to resuming duties was less convenient than only taking a moment to do so. Within the described situational context, which asked the soldiers to imagine that they were on a training exercise with their unit on a 70 °F dry day and that after 4 h of marching a 30-min stop was signalled, it was not unreasonable that waiting to receive an MRE sitting vs. standing had the largest impact on perceived inconvenience ($\beta = 0.58$, deviance = 58.3%).

The model for effort was similar to that for inconvenience and all effects were in the expected directions. Not unexpectedly, the beta-coefficients for the two factors that primarily manipulated effort, which in this study were meal acquisition and eating, were larger than those manipulating primarily time (meal preparation and disposal). When analysing the choice data elicited with respect to how time-consuming the MRE meal situations were, only three of the four factors contributed significantly to the model. Among the three significant factors, the effects were in the expected directions and the beta-coefficient for the factor manipulating heating time of the main dish was largest. Interestingly, the additional 5 min required to heat the main dish was perceived as contributing more significantly to how time-consuming the meal situation would be compared to the 3–5 min of time to be spent clearing one's area prior to resuming duties (68.6% vs. 18.9% explained deviance). The factor pertaining to meal acquisition was not significant. That is, standing and waiting to receive a meal was not considered more time-consuming than sitting down and waiting to receive it. This finding, which was confirmed by the manipulation check, was not surprising. The time to receive a meal is no different whether one is standing or sitting.

To explore differences in perceived inconvenience, time and effort of the MRE meal situations, three sets of models comparing the dependent variables, two at a time, were estimated. In each case, a dummy variable was used to represent these two dependent variables and this enables

Table 2
Results of multinomial logit regressions

Factor	Factor levels	Inconvenience			Time			Effort		
		β[a]	Significance	% Deviance	β	Significance	% Deviance	β	Significance	% Deviance
Acquisition	Sit (*L*)/stand (*H*)	0.58	***	58.3	−0.06	ns	0.4	0.64	***	36.1
Preparation	5 min (*L*)/10 min (*H*)	0.31	**	17.0	0.74	***	68.6	0.49	***	20.7
Eating	Water (*L*)/cold beverage (*H*)	0.21	*	7.7	0.31	**	12.1	0.62	***	33.7
Disposal	Clean up a moment (*L*)/3–5 min (*H*)	0.31	**	17.0	0.39	***	18.9	0.33	**	9.5

Note: MNL modelling summaries for response variables are: inconvenience model [non-censored observations = 430, $-2\log L$ (with covariates) = 542.1, chi-square (log likelihood) = 54.0, df = 4, $p<0.0001$]; time model [non-censored observations = 360, $-2\log L$ (with covariates) = 439.3, chi-square (log likelihood) = 59.7, df = 4, $p<0.0001$]; and effort model [non-censored observations = 381, $-2\log L$ (with covariates) = 245.5, chi-square (log likelihood) = 82.7, df = 4, $p<0.0001$].

[a]The significance of model effects are shown in square brackets where *** denotes $p<0.0001$, ** denotes $p<0.001$ and * denotes $p<0.05$.

Table 3
Differences in perceived inconvenience, time and effort

Model effect	Inconvenience (base) vs. time		Inconvenience (base) vs. effort		Effort (base) vs. time	
	β	*p*	β	*p*	β	*p*
Acquisition	0.58	<0.0001	0.58	<0.0001	0.64	<0.0001
Preparation	0.31	0.002	0.31	0.002	0.49	<0.0001
Eating	0.21	0.041	0.21	0.041	0.62	<0.0001
Disposal	0.31	0.002	0.31	0.002	0.33	0.004
Acquisition × response variable	−0.64	<0.0001	0.06	0.69	−0.69	<0.0001
Preparation × response variable	0.42	0.006	0.17	0.26	0.25	0.13
Eating × response variable	0.10	0.52	0.41	0.008	−0.31	0.06
Disposal × response variable	0.07	0.63	0.02	0.91	0.06	0.73

Note: MNL modelling summaries for response variables are: inconvenience–time model [non-censored observations = 790, $-2\log L$ (with covariates) = 981.5, chi-square (log likelihood) = 113.7, df = 8, $p<0.0001$]; inconvenience–effort model [non-censored observations = 811, $-2\log L$ (with covariates) = 987.6, chi-square (log likelihood) = 136.7, df = 8, $p<0.0001$]; and effort–time model [non-censored observations = 741, $-2\log L$ (with covariates) = 884.8, chi-square (log likelihood) = 142.4, df = 8, $p<0.0001$].

the differential impact of each of the stages of the meal consumption process on the judgement given to be investigated by including the interaction between this dummy variable and the factor corresponding to the stage examined in the model. For example, for the model comparing inconvenience and time, inconvenience was set as the dummy variable reference level and a significant interaction would provide evidence that the relation between the focal design factor and the time judgement differs to the relation between this design factor and the inconvenience judgement.

Table 3 presents the results of these analyses and shows that for the time vs. inconvenience model, the interaction between the dummy variable (representing "type of convenience") and the meal acquisition factor was highly significant ($p<0.0001$). It was perceived as more inconvenient than time-consuming to stand and wait to receive a meal pouch. The interaction effect pertaining to meal preparation was also significant ($p = 0.006$) and indicated that heating the main dish for 10 min was perceived as more time-consuming than inconvenient. When comparing the models pertaining to convenience and effort, only the interaction effect pertaining to eating the meal was significant. Preparing and drinking the cold beverage was seen as more effortful than inconvenient. With the exception of this factor, these results suggested similarity in perceptions of inconvenience and effort. The third model compared time and effort and, as expected, the interaction effect pertaining to meal acquisition was highly significant. Standing and waiting to receive a meal pouch was perceived as more effortful than time-consuming. The interaction effect pertaining to eating the meal was borderline significant ($p = 0.06$) and with a negative beta-coefficient. This suggested that preparing and drinking the cold beverage was seen as more effortful than time-consuming.

The notion that the total amount of (in)convenience associated with a consumption situation is apportioned across one or more stages in the consumption process was also supported by the findings. As shown in Table 2 each of the four stages in the MRE meal process contributed to perceived inconvenience. In addition, a further valuable insight regarding this result is contained in Table 4, which presents the MNL model for perceived inconvenience based on the second experimental design (Design B). For this design (Table 4) the factor pertaining to eating the

Table 4
MNL model for inconvenience for Design B

Factor	Low	High	β	Significance[a]	% Deviance
Acquisition	Swap one meal item with one person	Swap three meal items with three people	0.40	**	17.9
Preparation	Heat the main dish for 8 min	Heat the main dish for 10 min	0.39	**	16.6
Eating	Open the main dish pouch and then simply eat the food	Knead the main dish pouch, open it and stir food before eating	0.12	ns	1.5
Disposal	Place trash from your own meal in a refuse bag that is a couple of yards away	Place your trash and that from four others in a refuse bag that is 25 yards away	0.76	***	64.0

Note: MNL modelling summary is: non-censored observations = 486, $-2\log L$ (with covariates) = 509.1, chi-square (log likelihood) = 77.2, df = 4, $p<0.0001$.

[a]The significance of model effects are shown in square brackets where *** denotes $p<0.0001$, ** denotes $p<0.001$ and * denotes $p<0.05$.

meal was non-significant ($p = 0.27$) and the factor pertaining to the disposal stage of the meal cycle had the largest impact on perceived inconvenience ($\beta = 0.76$, deviance = 64.0%). The additional insight alluded to above stems from a comparison of the inconvenience models in Tables 2 and 4. This comparison reveals that the relative importance of the factors that contribute to perceived inconvenience differ across the two models. Thus, it appears that the stages in the meal process that contribute to perceived inconvenience and their relative importance are functions of the situational characteristics of the meal process itself.

Discussion

For planners of military rations and field feeding, the present research points to the need to go beyond the current limited focus on the human factor aspects of packaging design in order to improve the convenience of rations. A systematic analysis of all elements of the provisioning/consumption process from ration distribution to post-consumption stages must be conducted in order to improve ration convenience. In addition, at each stage, the ration must be analysed for its impact on both the time and effort expended by soldiers in the process. By analysing the convenience construct in a more systematic and comprehensive way, it may be possible to improve MRE consumption and, in turn, improve the nutrition and performance of tomorrow's soldiers. The present study is the first step in that direction. With a view to future research we devote the reminder of this section to a discussion of the key findings of this research as they relate to improving our understanding of the complex construct of convenience. While we acknowledge the need to be cautious in generalising the findings beyond the present population and situational meal context, we suggest they may be drawn upon to inform directions for further inquiry.

As intuition suggests, the findings from this research suggest that there are differences between the constructs of convenience, time and effort. When seeking to measure how (in)convenient any given consumption situation is, one implication of this finding, therefore, is the need to capture both the time and effort components of convenience. While previous authors have acknowledged the role of both these components, to our knowledge their separate "nature" has not previously been shown empirically. A new question immediately follows this understanding. If time and effort are separate constructs, in what ways (if any) are they linked? Quite clearly the two are linked to each other, because effort requires time. As an example, notice how in Design A we were not able to manipulate time (i.e., duration of a meal stage) without influencing the perceived effort associated with the stage. Consider the factor pertaining to MRE meal preparation (i.e., heating the main dish 5 vs. 10 min). Primarily time, not effort is required to heat the main dish the additional 5 min, and it was intended that this factor would manipulate time almost independently of effort. However, in the model that compared perceived time and effort, the interaction effect between the dummy variable representing these response variables and MRE meal preparation was not significant ($p = 0.13$) and revealed that the amount of time required and effort involved with this additional heating time was not perceived differently.

Having established the separate but linked roles of time and effort for perceived (in)convenience and considering that, ultimately, this research is intended to contribute to the development of a more complete conceptualisation of the convenience construct, it is appropriate to take a step back and consider the constructs of time and effort themselves. Previous authors have noted the multidimensional nature of both constructs. For example, the literature pertaining to time perception acknowledges: that perception of time duration is dependent on whether the time interval is empty or taken up by an activity; that consumers' experience of time is highly subjective and can differ radically from clock time; and that consumers' value of time is not constant but situationally dependent (e.g., Block, 1990; Darian & Cohen, 1995; Graham, 1981; Hornik, 1984; Ihle & Wilsoncroft, 1983; Mantel & Kellaris, 2003). There are at least two broad dimensions of effort (physical and mental/cognitive), of which the former appears in itself to be a complex construct that, besides

physical factors such as strain, is also influenced by physiological and psychological factors (Noble & Robertson, 1996). Gibbs and Drolet (2003) demonstrated how consumption effort (i.e., the mental cost of a consumption situation) influences consumer behaviour. In addition, both time and effort appear to include cognitive and affective components. When we are asked to provide a judgement of how time-consuming is something, this seems to call for an objective assessment of duration in which the negative element associated with waiting time is not reflected. Tentatively, when asked to rate effort, participants may, therefore, "dump" the negative hedonic component of waiting time into the judgement, because effort, by its very nature, has negative emotional effects (e.g., Garbarino & Edell, 1997). Ratings of perceived effort may, thus, also comprise the negative element of effort and the dumped negative association of waiting time. Clearly, in order to move towards a complete conceptualisation of the convenience construct, the nature of its antecedents must be fully understood, and further research is required to do so.

In light of the above discussion regarding the multidimensional nature of time and effort, we acknowledge the possibility that the measurement scales used in the present study may not adequately have captured perceived time and effort. In exploring this possibility further, the literature on duration neglect offered some insight. Briefly, duration neglect is the term used to describe that duration of extended experiences is an "attribute" that people are likely to neglect (Ariely, Kahneman, & Loewenstein, 2000). As part of their study of the relationship between hedonic value of momentary experiences and the global evaluation of extended periods, Varey and Kahneman (1992) were among the first to demonstrate this phenomenon. For example, these authors expected that the overall evaluation of a painful experience, such as carrying a heavy suitcase for a long distance or standing in fixed position for a prolonged period of time, would be determined jointly by the intensity of the experienced affect (discomfort) and the duration of the episode. Contrary to expectations, however, global evaluations showed a pronounced disregard for duration. Fredrickson and Kahneman (1993, p. 54) stated that "although people may be aware of duration and consider it important in the abstract, we suggest that what comes most readily to mind in evaluating episodes are the salient moments of those episodes and the affect associated with those moments." To minimise duration neglect, Ariely and Loewenstein (2000) highlighted the importance of using wording that elicits overall global evaluations summing an experience over time, for example, "global evaluation of how bad the overall experience is" or "the total amount of pain." However, they warned that the concept of total quantities of experiences can be more (e.g., hours slept last night) or less defined (e.g., the volume of a rock concert) and suggested that ambiguity over what the question is calling for may lead respondents to ignore duration. Participants in our study were instructed to choose in each choice set the MRE meal situation that was the most convenient, time-consuming or requiring the most effort. Tentatively, instructions worded: "please indicate the MRE meal situation that in your mind requires the smallest amount of total effort," may have led to different findings.

Regarding the "timing of convenience" dimension, the present results suggest that: (a) the inconvenience of a consumption situation is attributed to the inconvenience experienced across one or more stages in the consumption process; and (b) the situational characteristics of the meal influence which stages in the consumption process contribute to perceived inconvenience. The former result draws attention to the importance of adopting a consumption process perspective when studying convenience. Although conceptually recognised as possible, this fact has not previously been empirically demonstrated. The implication of this finding highlights the importance of adopting a *meal* perspective, as opposed to the convenience foods *product* perspective that is prominent in the existing literature (e.g., Capps, Tedford, & Havlieck, 1985; Kim, 1989; Langen, 2003; McCullough et al., 2003; Pszczola, 2001; van der Pol & Ryan, 1996). In addition, research that focuses on only the preparation stage of the food provisioning process (e.g., Candel, 2001; van der Pol & Ryan, 1996) is similarly incomplete. Authors continuing in these traditions should put forward convincing arguments for why they choose to do so.

In accordance with widely accepted knowledge (e.g., Belk, 1975; Meiselman, 1994), an influence of situational context[1] was also encountered in the present study. For the study of convenience, the role of situational dependence suggested by the findings of the present research also has several implications. First and most obvious is the fact that the results observed here in the context of military field feeding of MREs may be far different than results that might be obtained in other meal contexts, whether institutional or non-institutional. Secondly, if we accept that the inconvenience associated with a meal is situationally dependent, it then follows that some meals are more convenient than others and vice versa. From the perspective of seeking to understand where and why consumers demand convenience, this points to a need for

[1] In accordance with the extant literature we use the term situational context broadly. Specifically, our perspective is informed by Meiselman (1994), who classified context variables into three types, those associated with the food, individual and situation. With respect to the latter, Meiselman et al. (1988) described these are generally social and physically related characteristics associated with eating of a meal. Our perspective is also consistent with the more recent work published by Bisogni et al. (2007), who expanded on Mieselman's taxonomy. Briefly, this latter group of authors used 24-h food diaries to investigate situational effects of food and beverages consumption. Over the course of seven 24-h periods, participants recorded non-sensory characteristics associated with their eating episodes. A classification of variables into eight categories resulted (food and drink, time, location, activities, social setting, mental processes, physical condition and recurrence), each having several underlying dimensions.

understanding *which* convenient consumption situations are particularly desired.

Conclusion

Three conclusions emerge from the present research: (1) time, and effort and (in)convenience appear to be separate constructs; (2) the perceived inconvenience associated with a consumption process is apportioned across the several stages in the meal cycle; and (3) which stages contribute to perceived inconvenience and their relative importance depends on the characteristics of the meal situation itself. These results were obtained in an empirical study pertaining to low-preparation, all-in-one, military meals. As opposed to the convenience foods focus common to much of the extant literature on convenience and food, the *meal* focus offered by this empirical study is one of the strengths of the present research. In closing we note that although the present research has contributed towards a fuller understanding of the convenience construct, the need for future research remains. Further to capturing other populations and contexts, such research must, as noted by Wardle (1999), also accommodate the notion that demand for convenience is neither solely about time saving nor labour saving, but also a matter of social context.

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