Consumer segmentation based on situational appropriateness ratings: Partial replication and extension

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ABSTRACT

Perceived situational appropriateness crucially informs decisions about what to eat and drink, and this contextual-cognitive factor of food choice helps to understand why in certain situations, despite high acceptability, a non-consumption decision is made. Being shaped primarily by accumulated experience and familiarity, appropriateness is influenced by culture, but inter-individual variability within populations also exists. Consumer segmentation based on appropriateness ratings was recently reported in work with Australian consumers, with segment differences relating to how adaptive or conforming consumers' perceptions were of appropriateness for a range of foods and beverages (F&B) for use in daily main eating occasions [Jaeger et al.; Fd. Qual. Pref., 2019, e103701]. Believing in the strength and value of cumulative evidence, the present research was informed by the broad paradigm of replication and extension. This directed that empirical execution, data analysis and reporting strategy directly and extensively defined this work. In two studies with consumers from Denmark (n = 780) and New Zealand (NZ, n = 448), partial replication was achieved for situationally *Adaptive* and *Conforming* consumer segments in regard to breakfast, lunch and dinner (morning, midday and evening meals, respectively). Extending to three different eating occasions in NZ, partial replication of *Adaptive* and *Conforming* consumer segments was obtained. It appeared that these segments exist for some but not all eating occasions and that cultural differences are also at play. The present research also replicated the relationship between perceived appropriateness and F&B liking/disliking, whereby liked products can be both appropriate and inappropriate, depending on the eating occasions. Consumer segments based on appropriateness ratings had similar profiles, which also replicated Jaeger et al. (2019).

1. Introduction

1.1. Inter-individual heterogeneity in perceived situational appropriateness

Perceived situational appropriateness crucially informs consumers' food choice decisions (Belk, 1975; Schutz, 1988, Schutz, 1994; Marshall, 1993; Giacalone, 2019; Giacalone & Jaeger, 2019a, 2019b), but remains much less widely studied than hedonic influences. Representing the degree of fit between products and different use situations, this contextual-cognitive factor provides understanding about why lamb chops, say, are not eaten for breakfast, or, similarly, why cereal is rarely eaten at dinner-time (e.g., Bian & Markman, 2019; Jaeger et al., 2009). Dishes that are not regarded as situationally appropriate for a given eating occasion are rarely consumed, despite high acceptability (e.g., Marshall, 1993; Jaeger & Porcherot, 2017).

Situational appropriateness is not similarly perceived by everyone, and because appropriateness is primarily formed through accumulated experience/ familiarity (Marshall, 1993; Rozin, 2006) large cultural differences exist. Examples hereof include cross-cultural differences in situational use of specific products (e.g., Nantachai et al./2) (1991); Jaeger (2000)), differences in what constitutes a typical morning meal around the world (e.g., Walloga, 2015), and differences between countries with similar cultures in what is eaten and/or when (e.g., Holm et al., 2012; Howden et al., 1993). Illustrative of the latter is different meal patterns in the Nordic countries which culturally are very similar (Gupta et al., 2002). Typically, people in Denmark and Norway eat one hot meal a day, compared to two hot meals a day in Finland and Sweden, and consequently warm dishes which Swedes, for example, regard as appropriate for a midday meal, may be less appropriate for lunch in the eyes of Danes.

Within a certain population, research pointing to heterogeneity in perceived situational appropriateness was probably first reported by Baird (1976), who identified consumer segments based on ratings of appropriateness for 20 foods in 25 use situations among homemakers in the USA. In turn, these segments shared similarities with segments established by Rucker and Schutz (1982) in a study with a broader group of foods and uses. A recent study with Japanese consumers (Sproesser et al., 2018) also support inter-individual heterogeneity in situational appropriateness through findings that younger and older people differ in their perceptions about compliance with collective rules about eating and drinking (e.g., of the family, community, society). Compared to older men and women, younger men and women regard such compliance as more indictive of traditional eating behaviours.

Direct evidence of consumer segmentation based on appropriateness ratings was recently presented by Jaeger, Roigard, Le Blond, Hedderley, and Giacalone (2019) who identified segments of situationally *Adaptive* and *Conforming* consumers, thus named because of seemingly differential conformity to common norms about what is appropriate to eat and drink at the three daily main meals. The main study was conducted with ~750 Australian consumers who for eating occasions taking place at, respectively, breakfast-, lunch- and dinner- time rated 20 food names for perceived situational appropriateness (7pt scale, 'not at all' to 'very'). Within eating occasions, hierarchical analysis performed on the appropriateness ratings resulted in two main segments which were characterised by consistent response patterns after which the segments were named (*Adaptive* and *Conforming*, respectively). Consumers in the *Adaptive* segments regarded more foods and beverages as situationally appropriate than did their counterparts in the *Conforming* segments. Using the breakfast-time eating occasions as an exemplar, the segments were in agreement on traditional breakfast foods being highly appropriate (e.g., 'scrambled eggs,' 'cereal/muesli'), but they differed in degree of appropriateness for items less typically consumed in Australia at breakfast-time. Foods clearly associated with lunch-time and dinner-time eating occasions (e.g., 'sushi,' 'mixed green salad,' 'instant noodles,' 'Thai green curry') were regarded as inappropriate for breakfast in both segments, but more so by consumes in the *Conforming* segment. For the dinner-time eating occasion, items like 'egg mayonnaise sandwich,' 'scrambled eggs' and 'croissant' were regarded as more appropriate by consumers in the *Adaptive* segment than consumers in the *Conforming* segment. Importantly, these differences in situational appropriateness ratings were established in the absence of large segment differences in overall mean values for liking of the studied food and beverage names (0.5 scale points or less on the 9-pt hedonic scale), and also in the absence of large differences in participant characteristics (demographic, socio-economic and psychographic).

Being the first study to formally investigate consumer segmentation with regard to perceived situational appropriateness of foods and beverages (F&B), the findings of Jaeger et al. (2019) require replication and extension – that is, corroboration and additional research to establish whether situationally *Adaptive* and *Conforming* consumer segments generalise to new eating situations and consumer populations. Against this background, the present research presents two studies that draw directly and extensively on Jaeger et al. (2019) to continue research into consumer segmentation based on appropriateness ratings (Table 1). The primary objective of Study 1, conducted in Denmark (DK) was to replicate Jaeger et al. (2019) with regard to appropriateness-based consumer segments for daily main eating occasions (breakfast, lunch and dinner)[1]. Because appropriateness is a culturally embedded construct, there was considerable value in extending the work cross-culturally. Denmark, with its Nordic European culture is different to Australia which has an Anglo-Saxon culture (Gupta et al., 2002). For Study 2, which was conducted in New Zealand (NZ), the primary

objective lay in extending Jaeger et al. (2019) to different eating occasions in a culture that, generally and with respect to food, is similar to Australia (Hofstede Insights, 2010; Worsley & Scott, 2000).

1.2. Characterisation of consumer segments based on appropriateness ratings

In a further direct parallel to Jaeger et al. (2019), the present research also addressed two additional research objectives, which were characterisation, within and across consumer segments, of the relationships between appropriateness and acceptability for F&B items (Obj. 2), and segment profiling using demographic and psychographic variables (Obj. 3) (Table 1).

Similarly to Objective 1, these two objectives were directly defined by the research strategy of replication and extension. It was expected that a positive relationship between perceived appropriateness and stated product liking would exist whereby less liked foods/beverages would be regarded as less appropriate (Obj. 2). This has been reported previously by, for example, Cardello and Schutz (1996), Cardello, Schutz, Snow and Lesher (2000) and Lähteenmäki and Tuorila (1995). Based on Jaeger et al. (2019) it was additionally expected that nonlinearity in this relationship could exist, such that some highly liked foods would be inappropriate for a focal eating occasion (e.g., cereal/muesli at dinner time).

With regard to demographic/socio-economic and psychographic variables, the findings of Jaeger et al. (2019) suggested that these would be largely unsuccessful in explaining segment differences. One exception was the food neophobia trait, which characterises the fear and avoidance of unfamiliar foods (Pliner & Hobden, 1992). In some instances food neophobia was linked to reduced perceived appropriateness, although generally, consumers with high levels of neophobia (scores of 50 or greater on a 10 to 70 scale) responded similarly to the total sample in terms of those F&Bs they considered to be more or less appropriate for breakfast, lunch and dinner.

2. Materials and methods

The research strategy, as explained above was replication and extension. To achieve this, the empirical approach (including data analysis) of Jaeger et al. (2019) was closely followed. The reporting style of Jaeger et al. (2019) was also replicated as far as possible.

2.1. Study 1

2.1.1. Participants

The participants in Study 1 (18–69 years old, 49% female) were members of a ISO-certified web panel (Lightspeed GMI Global) and lived in Denmark (excluding Greenland and the Faroe Islands). Full completions were obtained from 780 people, who qualified for participation if they had no known allergies, dietary intolerances or specific food aversions that prevent them from having a normal diet, did at least some of the grocery shopping and food preparation for their household. Part 1 of Supplementary Material provides summary demographic and socio-economic details about the participants.

The research was covered by a general approval for sensory and consumer research from the Human Ethics Committee at the New Zealand Institute for Plant and Food Research (PFR). Participants consented to taking part and were assured that their responses would remain confidential. As compensation for their time, participants earned loyalty points from the web panel administrator, to be redeemed at a later time.

2.1.2. Food and beverage (F&B) names

For consistency with Jaeger et al. (2019), written stimuli were used in Study 1. The same guiding principles for stimuli development used by Jaeger et al. (2019) were adopted, namely: i) within an eating

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[1] We use the terms breakfast, lunch and dinner to refer to eating occasions taking place, respectively, in the morning, at midday, and in the evening.

Table 1
Overview of research objectives for Study 1 and Study 2, described with reference to Jaeger et al. (2019) [FQAP, e103701], and the manners in which they replicate and/or extend on this paper. Studies 1 and 2 were conducted using written stimuli (F&B names), and ratings of perceived situational appropriateness were obtained on a 7-pt scale (1 = 'not at all appropriate'; 7 = 'very appropriate'). Stated liking for F&B items were obtained on a 9-pt scale (1 = 'dislike extremely'; 9 = 'like extremely').

Research objectives	Study 1 (Denmark)	Study 2 (New Zealand)
Obj. 1: Replicating appropriateness-based consumer segments for daily main eating occasions (**1a**), and extending to new eating occasions (**1b**) and new F&B items (**1c**)	N = 780 (online) 3 contexts, 25F&B names per context **1a**: breakfast, lunch and dinner **1c**: Danish F&B items	N = 448 (CLT) 6 contexts, 8F&B names per context **1a**: breakfast, lunch and dinner **1b**: children's 7th birthday party, healthy breakfast, when feeling blue **1c**: New F&B items for daily main eating occasions and 3 new occasions
Obj. 2: Replicating the appropriateness-liking relationship	Yes	Yes
Obj. 3: Profiling appropriateness-based consumers segments	Yes	Yes

Notes: N = number of consumer participants; CLT = Central Location Test; NZ = New Zealand; F&B = Food & Beverage.

occasion, the F&B items should span from high to low appropriateness, ii) both foods and beverages were included in each eating occasion as meals include both types of stimuli, iii) a mix of simple to complex products in each occasion to represent basic to more elaborate eating occasions, iv) avoidance of F&B items expected to be unknown by a large proportion of the general public, and v) avoidance of F&B items expected to be quite disliked by a large proportion of the general public as these are rarely consumed and generally perceived as inappropriate across many eating occasions (Lähteenmäki & Tuorila, 1997).

Authors SRJ and DG have in-depth knowledge of Denmark and its food-related habits and culture, and developed an initial list of 25F&B items for each of the breakfast, lunch and dinner occasions. The web interface was used to obtain appropriateness responses for 100 consumers meeting the criteria for inclusion in the main study. Based on their responses, and those of another 100 consumers in a second round of pilot testing, the F&B names for the main study were selected. Part 2 of Supplementary Material lists the F&B items in Danish, and identifies those that were identical to Jaeger et al. (2019). It is not unexpected that there be some overlap in F&B items across studies, since people, regardless of whether they live in Denmark or New Zealand consume beverages such as water, coffee and beer and eat cereal/muesli, fruit salad and sushi.

2.1.3. Empirical procedures

A structured questionnaire was used, which was the approach in Jaeger et al. (2019). Situational appropriateness for F&B names (Obj. 1) was rated on a 7-pt scale ('not at all appropriate' (1), 'very appropriate' (7)) (Schutz, 1988, Schutz, 1994), according to the instructions: "How appropriate are the following foods/beverages for < meal name > ?" The names "breakfast" (*morgenmad* in Danish), "lunch" (*frokost*) and "dinner" (*aftensmad*) were used as are widely understood in Denmark to reference eating occasions taking place in the morning, mid-day and evening, respectively. Each participant rated the 25 items for each of the three eating occasions, but did not progress from one occasion to another until all items for one eating occasion had been rated. The F&B names were shown in randomised order across participants, and the eating occasions were also presented in randomised order.

Stated liking for each of the F&B items were obtained subsequent to all appropriateness evaluations, using a 9-pt scale (1 = 'dislike extremely', 9 = 'like extremely') (Obj. 2).

For Obj. 3, directly mirroring Jaeger et al. (2019), several psychographic variables were measured, including food choice motives (FCQ: Onwezen et al., 2019). In response to the prompt "It is important to me that the food I eat on a typical day …," participants used a 4-pt scale (1 = 'not at all important', 2 = 'a little important', 3 = 'moderately important' and 4 = 'very important') to rate 11 statements which mapped onto food choice factors: health, mood, convenience, sensory appeal, natural content, price, weight control, familiarity, and ethical (comprising: environment, animal welfare and social justice) (In Study

2 the 4-pt scale was extended to 7-pt with the same verbal anchors, placed at 1, 3, 5 and 7). The 10-item Food Neophobia Scale (FNS) was also administered (Pliner & Hobden, 1992), with responses on a Likert scale (1 = 'disagree strongly', '7 = 'agree strongly'), as was a validated scale for measuring general tendency to conform (Goldsmith et al., 2005), presenting seven word pairs as semantic differentials on a 7-pt scale (e.g., inflexible – adaptive, opposing – accommodating). In Study 1 only, an attempt was made to capture tendency to conform specifically with regard to eating and drinking. A 10-item composite measure was developed by the authors and revised following discussion with colleagues. A 7-pt Likert scale was used to rate the items, which included: "Once in a while, I think it is okay to have cereal for dinner," and "I follow the social conventions about what foods should be eaten for breakfast, dinner and lunch." Part 3 of Supplementary Material has full details, including Danish translations.

Standard demographic and socio-economic questions were asked last. For all multi-item scales used in the background section of the questionnaire, items were presented in randomised order across participants.

Participants completed the survey on a desktop or laptop computer in a location of their own choosing. The average time to complete the survey was 16.5 min.

2.2. Study 2

2.2.1. Participants

Study 2 took place in Auckland (New Zealand) with 448 consumers (20–66 years old, 53% female) (Part 4 of Supplementary Material has full details) who attended sessions at a central location test facility. Participants were recruited by a professional agency, and qualified for participation if they are willing to consumer a wide range of food and beverage products and were free of major dietary restrictions and allergies (e.g., nut, lactose, gluten).

The research was covered by a general approval for sensory and consumer research from the PFR Human Ethics Committee. Participants gave informed consent and were assured that their responses would remain confidential. As compensation for their time, participants received cash.

2.2.2. Eating occasions

To replicate and extend Jaeger et al. (2019), the three contexts from that study (i.e., "breakfast-time", "lunch-time" and "dinner-time") were used in Study 2, and three new contexts were also included (Obj. 1).

Rather than being defined by time of day, the new contexts comprised two or more of the eight dimensions of eating and drinking occasions proposed by Bisogni et al. (2007). The occasion "children's 7th birthday party" was chosen to represent a social gathering and a special occasion shaped by traditions and social norms. The two other new contexts - "when feeling blue" and "healthy breakfast" – represented

contexts where strong personal preferences and beliefs could influence perceived appropriateness of F&B items. When feeling blue, it is not uncommon to consume foods and beverages that offer some sort of emotional comfort (Spence, 2017a), although what these comfort foods are differ from person to person and vary, for example, with past experiences, gender and age (Wansink, Cheney, & Chan, 2003). They may therefore not be strongly regulated by social norms.

At present there is no agreed answer to the question of what constitutes a healthy breakfast. According to Gibney et al. (2018) of the International Breakfast Research Initiative, breakfast-specific dietary guidelines that are both nutrient- and food-based do not exist. For guidance consumers must draw on recommendations for healthy eating that pertain to overall daily patterns, and this, together with considerable diversity in breakfast choices (e.g., Eilat-Adar et al., 2011), potentially allows for great variation in beliefs about what a healthy breakfast is. Personal food preferences and healthy eating beliefs may, therefore, be very important in shaping perceived appropriateness for F&B items in relation to the eating occasion "healthy breakfast."

2.2.3. F&B names

Study 2 included six contexts, and to keep the respondent burden manageable, eight F&B names were used in each context. Those used for the three daily main eating occasions ("breakfast-time", "lunch-time", "dinner-time") were predominantly drawn from Jaeger et al. (2019), which was regarded as acceptable considering the cultural similarity between New Zealand and Australia (Green & Power, 2006; Hofstede Insights, 2010) also in terms of eating and drinking habits (Worsley & Scott, 2000). The three new F&B items were selected from the responses obtained in Follow-up Study 2b in Jaeger et al. (2019) where consumers were asked to describe something they had previously eaten for breakfast, lunch or dinner that others would regard as less conventional and not fitting with common norms for this type of eating occasion. For the breakfast occasion, this resulted in inclusion of 'steak and cheese pie' and 'leftover pizza', and 'cheese on toast' for the dinner occasion. Overall, it was the intent that the eight F&B items for each eating occasion would span from 'low' to 'high' appropriateness.

This principle also guided development of F&B items for the three new contexts in Study 2. Two authors (SRJ and CMR) developed a preliminary list of items, which was revised through discussion with sensory professionals at PFR until agreement. In a few instances, F&B names from Jaeger et al. (2019) were used, but mostly new items were chosen as directed by Objective 1c (Table 1). In a single instance, a branded product was used since it was feared that a more generic description would not convey the product identity as clearly (Coco Pops®). Fig. 3 shows the F&B names by context, and items also used in Jaeger et al. (2019) are identified in Part 2 of Supplementary Material.

2.2.4. Empirical procedures

Study 2 also used a structured questionnaire, and similarly to Study 1 situational appropriateness for food and beverage names was rated on a 7-pt scale with end-points anchors 'not at all appropriate' (1) and 'very appropriate' (7), according to the instructions: "How appropriate are the following foods/beverages for < meal name > ?" Within eating occasions, the F&B names were shown in randomised order across participants, and the eating occasions were also presented in randomised order. Hedonic responses were obtained using the 9-point scale from Study 1 (1 = 'dislike extremely', 9 = 'like extremely'). The psychographic variables were also identical to Study 1 (see also Part 3 of Supplementary Material for full details). Standard demographic and socio-economic questions were asked last.

Data collection occurred at the PFR Consumer Insights Facility in Auckland as part of product research sessions involving several different products and questionnaire tasks. The average time to obtain the data linked to Study 2 was 13.5 min.

2.3. Data analysis

Data analysis was performed separately for each study using the procedures described below, which fitting with the "replication and extensions" research strategy mirrored those from Jaeger et al. (2019). All analyses were performed in R (v. 3.4.1, R Core Team, 2017). The significance level was 0.05.

Cluster analysis was performed on appropriateness ratings to establish consumer segments (Obj. 1). This was done separately for each eating occasion using the Manhattan distance in combination with complete linkage hierarchical clustering method (MacFie, 2007). For each context, the number of clusters were determined by cutting the dendrogram at a fixed height, and this approach sought to account for a significant amount of individual variation while still providing a good account of the data (based on visual inspection of the dendrograms). In Study 1 (Denmark), the dendrograms were cut at h = 120 resulting in two clusters per context, while in Study 2 (New Zealand), h = 40 was used, resulting in two clusters per context. The different values of h for the two studies was caused by different sample sizes and number of F&B stimuli within contexts.

Means and standard deviations for appropriateness ratings were calculated, both at the aggregate level and within clusters, and this was similarly done for hedonic ratings. Means were compared using ANOVA, and correlation coefficients determined the degree of association between situational appropriateness and stated liking (Obj. 2). The consumer segments were characterised using the available person-specific responses, with a comparison across the main clusters by ANOVA or non-parametric methods, depending on the nature of the variable (Obj. 3).
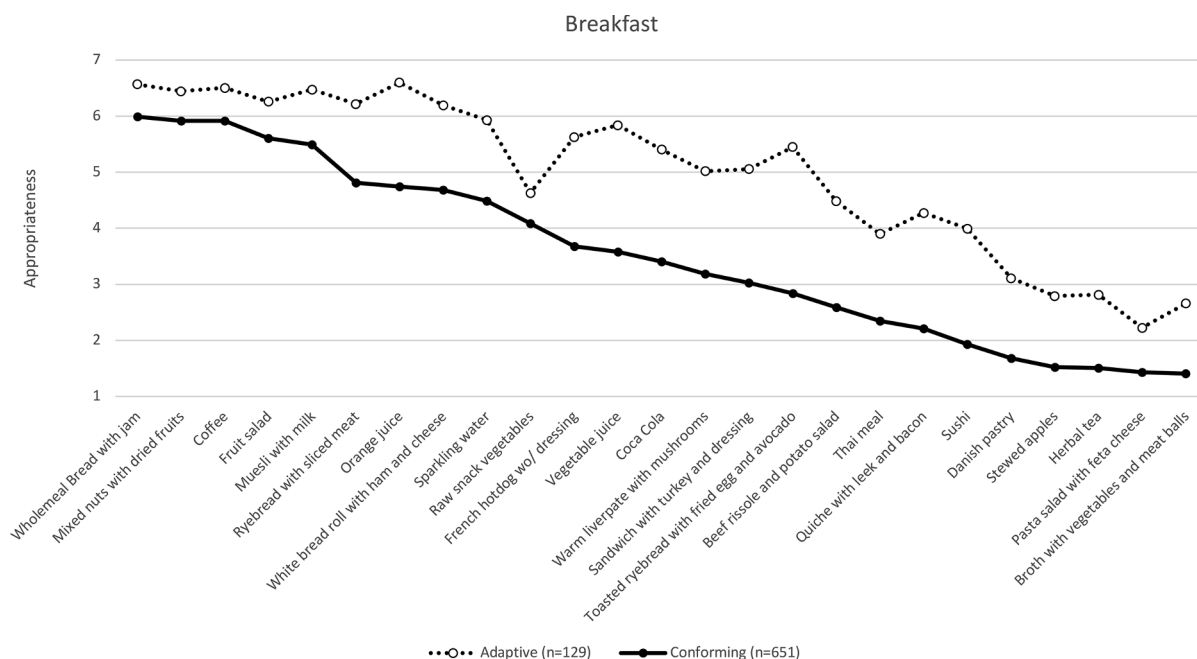
3. Results for Study 1: Denmark

In concordance with Jaeger et al. (2019), the results are presented by research objective and closely follow the reporting style of the original paper, hereby providing a point of reference for determining whether or not replication and extension was achieved.

3.1. DK: Clusters with varying patterns of situational appropriateness (Obj. 1)

For each of the three main meal occasions, two clusters were established of uneven sizes – one large (n = 653 to 697) and one small (n = 83 to 129). The average appropriateness for clusters across F&B stimuli are shown in Fig. 1 for the three occasions: breakfast (Fig. 1a), lunch (Fig. 1b) and dinner (Fig. 1c). Similarly to Jaeger et al. (2019), these line plots were constructed by sorting F&B items based on descending mean values for the cluster with the lowest overall appropriateness rating. The plots were inspected for evidence of *Adaptive* and *Conforming* patterns of appropriateness ratings similar to those seen in Jaeger et al. (2019). This original work served as the point of reference for how the segments' appropriateness ratings in each meal occasion would evolve relative to each other across the studied F&B items, and replication (or not) was determined relative to those original results.

Starting with dinner, Fig. 1c showed that the lines for the *Adaptive* segment (n = 653; dotted line with white circles) and the *Conforming* segment (n = 127; solid line with black circles) were: i) similar with regard to high appropriateness for traditional and popular evening meal dishes ('spaghetti Bolognese,' 'beef rissole and potato salad,' 'mixed grilled vegetables,' 'broth with vegetables and meat balls') and 'water,' ii) diverging in appropriateness for many F&B items where mean appropriateness ratings among consumers in the *Adaptive* segment were higher than among consumers in the *Conforming* segment, and iii) a closing of the gap in appropriateness ratings for the least appropriate dinner item – 'Danish pastry.' For some items, the average appropriateness ratings in the *Adaptive* segment were more similar to the *Conforming* segment than might have been expected based on adjacent F

Fig. 1. Results for Study 1 (Denmark) (Obj. 1). Line plots for consumer segments showing mean values for appropriateness (1 = 'not at all appropriate', 7 = 'very appropriate') for each of 25 food and beverage (F&B) items in each of three eating occasions, where: **(a)** "breakfast", **(b)** "lunch" and **(c)** "dinner". The number of consumers in each segment (n) is shown in the legend between brackets.

&B items ('beer,' 'French hotdog without dressing' and 'white bread roll with ham and cheese'), but these instances did not threaten the conclusion that Fig. 1c showed patterns of appropriateness ratings that fitted with Jaeger et al. (2019). Replication and evidence in support of appropriateness-based segmentation was therefore attained. Further support stemmed from the average appropriateness ratings across the 25F&B items were very different in the two segments: 5.1 vs. 3.6 (of 7, p < 0.001) while average liking was comparable, albeit lower in the *Conforming* segment: 6.9 vs. 6.2 (of 9, p < 0.001) (Table 2).

Results for the breakfast occasion (Fig. 1a) showed partial support

for the existence of *Adaptive* and *Conforming* consumer segments as defined by Jaeger et al. (2019). In Fig. 1a, the two lines of average appropriateness scores more or less followed the pattern described for Fig. 1c, but the differences in appropriateness ratings were generally smaller. For most F&B items generally regarded as appropriate for breakfast (e.g., 'wholemeal bread with jam', 'mixed nuts with dried fruit', 'coffee', 'fruit salad', 'muesli with milk') agreement existed between the two clusters. The divergence began with three items that are not uncommon for breakfast but not overly common either ('ryebread with sliced meat,' white bread roll and ham and cheese,' 'orange juice)
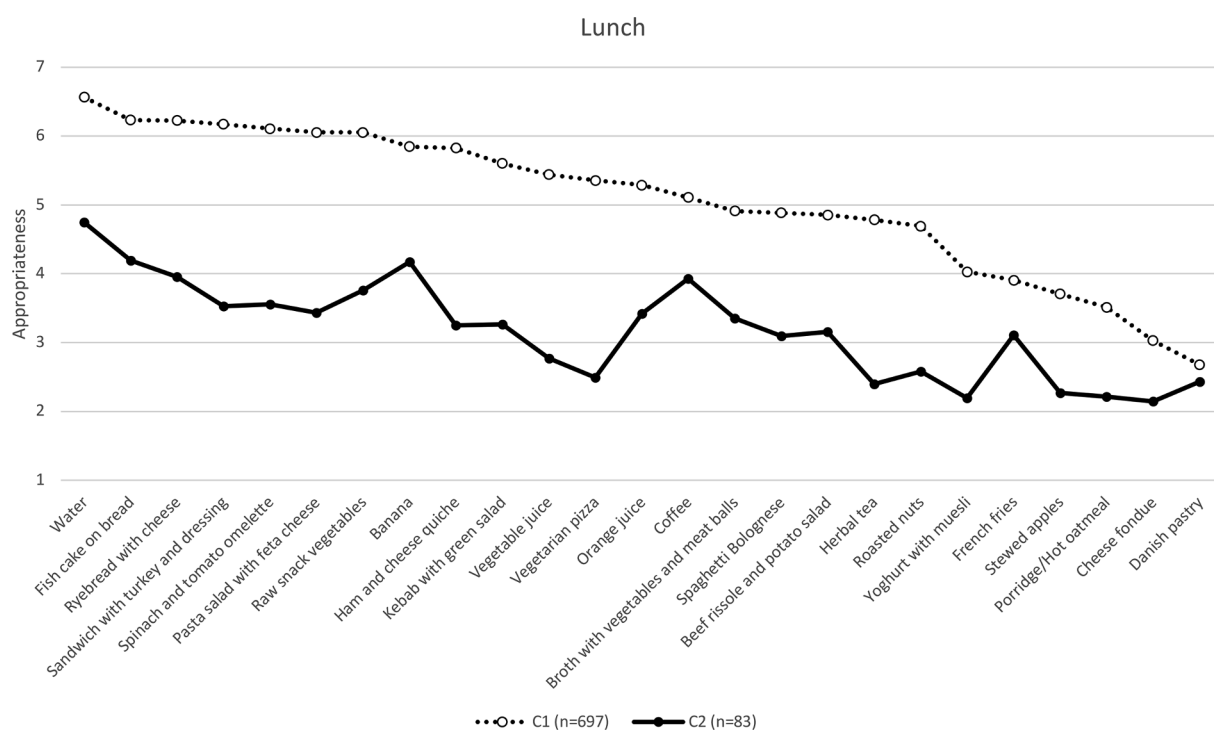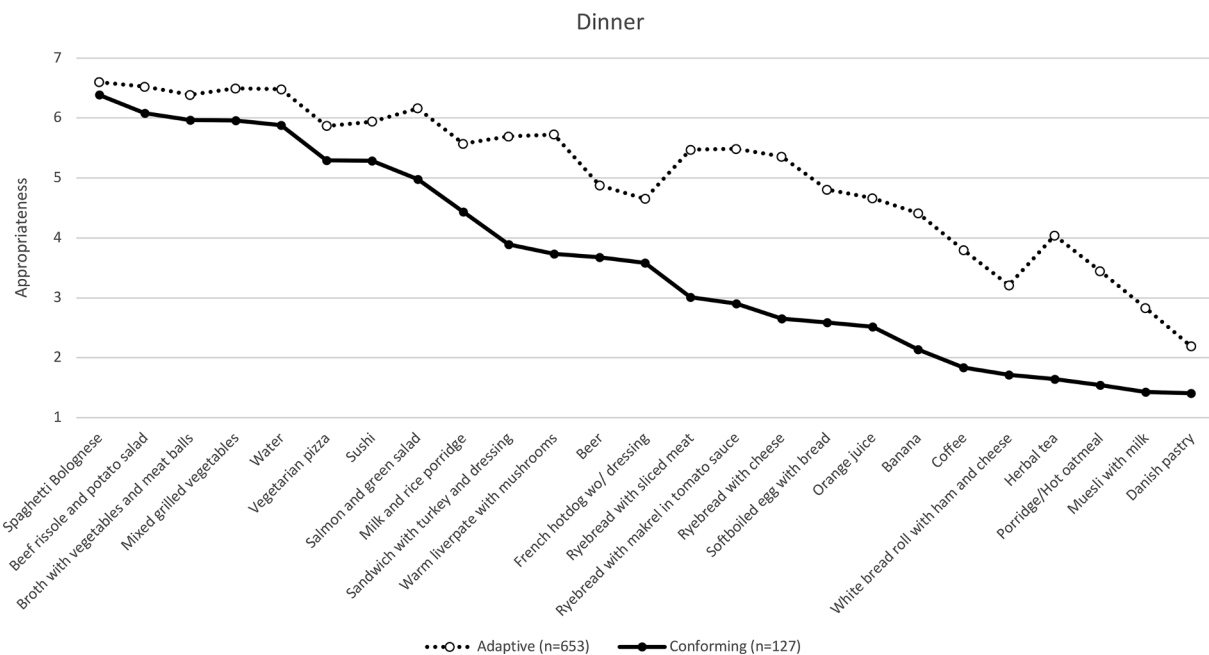

Fig. 1. (*continued*)

Fig. 1. (*continued*)

and then intensified for items more commonly associated with lunch (e.g., 'warm liver pate with mushrooms') and/or dinner (e.g., 'quiche with leek and bacon'), before narrowing somewhat again for F&B items that both segments regarded as largely inappropriate for breakfast (e.g., 'pasta salad with feta cheese'). As also seen for the dinner context there were F&B items where the difference in average appropriateness rating were considerably smaller or larger than would have been expected based on adjacent stimuli ('raw vegetables' and 'toasted ryebread with fried egg and avocado'), and when considered together with the broader response pattern in Fig. 1a, we cautiously interpreted the results as offering only partial support for the existence of *Adaptive* (n = 129) (dotted line with white circles) and *Conforming* (n = 651) (solid line with black circles) appropriateness-based consumer segments. Overall appropriateness scores were higher in the *Adaptive* segment than the *Conforming* segment (5.0 vs. 3.5 of 7; p < 0.001), with a difference in mean liking scores across the 25F&B items corresponding to that in the dinner context, and again overall liking was highest in the segment with the highest overall appropriateness score (7.3 vs. 6.5 (of 9, p < 0.001) for the *Adaptive* and *Conforming* segments, respectively).

In the lunch occasion, support for consumer segments fitting with *Adaptive* and *Conforming* appropriateness responses was not gained (Fig. 1b). In the large segment (C1, n = 697) the 25F&B items were ordered by perceived appropriateness in an interpretable manner. Sandwiches and light meals (e.g., 'ryebread with cheese,' 'sandwich with turkey and dressing,' 'pasta salad with feta cheese'), water, fruit and vegetables (e.g., 'banana', 'raw snack vegetables') were rated as more appropriate than less healthy options (e.g., 'kebab', 'pizza'). Appropriateness ratings declined further for more traditional evening meal dishes (e.g., 'beef rissole and potato salad') and was lowest for 'cheese fondue' and 'Danish pastry.' However, the average appropriateness values in small cluster (C2, n = 83) and their evolution across the 25F&B items did not differ from C1 in a manner that fitted with naming the clusters as *Conforming* and *Adaptive*, respectively. Foremost, there was no evidence of a small group of F&B items that both clusters regarded as being highly appropriate for lunch, and the most notable feature of the C2 ratings were their low values relative to C1. In the middle of the plot, where the largest differences between the two clusters' average appropriateness ratings should occur in order to replicate Jaeger et al. (2019), there were several instances of F&B items with lower or higher

ratings than would have been expected based on adjacent items. Overall appropriateness was ~ 2 scale points lower than for the C1 cluster (3.2 vs. 5.1, p < 0.001), and the difference in overall liking was also larger than seen in the breakfast and dinner contexts (6.9 vs. 5.4, p < 0.001).

3.2. DK: Segment characterisation – relationship with liking (Obj. 2)

The scatter plots of average liking against average appropriateness is shown for the three contexts in Fig. 2. For the lunch context (Fig. 2b), low liking and appropriateness responses stood out for the small C2 segment (dark circles), and a positive correlation was visible and confirmed in Table 2 as r = 0.71 (r < 0.001). In C2, 5 of the 25F&B items had average liking scores < 4 ("disliked slightly" or less) and besides 'herbal tea' and 'cheese fondue,' this group included 'yoghurt with muesli,' 'vegetarian pizza,' and 'vegetable juice.' 'water' and 'spaghetti Bolognese' were still highest liked (6.9 and 7.1, respectively). In the large C1 cluster (white circles), a positive correlation between liking and appropriateness also existed, but it was weaker (r = 0.53, p < 0.001) than in C2 (Table 2). F&B items with corresponding values of "low," "medium" and "high" values for liking could be seen, as well as items where liking and appropriateness were disassociated. For example, 'raw snack vegetables' and 'beef rissole with potato salad' were similarly liked (7.9 and 7.8, respectively), but differently appropriate for lunch (6.6 and 4.9, respectively), as were 'herbal tea' and 'cheese fondue' (liking: 5.3 and 5.2, respectively; and appropriateness: 4.8 and 3.0, respectively). This resembled the dual pattern seen in Jaeger et al. (2019) characterised by: (1) lack of association and (2) positive association.

For the dinner context, the correlation coefficients between liking and appropriateness (r between 0.44 and 0.46) were similar to that for the C1 cluster in the lunch context. The dual pattern was less clearly evident, but not absent. That is, there were examples of F&B items where liking and appropriateness were disassociated – pattern (1) - such as 'muesli with milk' and 'vegetarian pizza,' which were similarly liked (5.3) but inappropriate and appropriate, respectively, for lunch (1.4 and 5.3, respectively) (Fig. 2c, dark circles). In the larger *Adaptive* segment (white circles), similar duality existed, but appropriateness scores were higher overall. A seasonal influence in the data was likely evident for 'milk and rice porridge,' which was regarded as quite appropriate for dinner. Data collection took place in November and

Table 2

Results for Study 1 (Denmark, n = 780) (Obj. 3). Profiling of consumer segments based on appropriateness (1 = 'not at all appropriate'; 7 = 'very appropriate'), stated liking (1 = 'dislike extremely'; 9 = 'like extremely') and participant characteristics (mean values unless otherwise indicated) for the aggregate sample and appropriateness-based consumer segments in each of three eating occasions. The abbreviations A and C refer to *Adaptive* and *Conforming* appropriateness-based consumer segments, respectively. C1 and C2 refer to Cluster 1 and Cluster 2. Within each eating occasions, where significant differences between the consumer segments[$] were found at the 5% level, bold font is used.

Eating occasion		Breakfast		Lunch		Dinner	
Segment name	Aggregate	C	A	C1	C2	A	C
Segment size	*780*	*651*	*129*	*697*	*83*	*653*	*127*
Appropriateness	4.6	**3.5**	**5.0**	**5.1**	**3.2**	**5.1**	**3.6**
Stated liking	6.7	**6.5**	**7.3**	**6.9**	**5.4**	**6.9**	**6.2**
Correlation (means)[#]	0.26	−0.17	−0.01	0.53	0.71	0.46	0.44
Correlation (raw scores)[#]	0.29	0.16	0.15	**0.35**	**0.42**	0.33	0.31
Female (%)	48.7	47.2	56.6	**51.1**	**28.9**	49.2	46.5
Age [##]	4.0	4.0	3.9	4.0	3.7	**4.1**	**3.6**
Education [##]	3.9	3.8	4.0	**3.9**	**3.4**	3.8	4.0
Household size [##]	2.2	2.2	2.3	2.2	2.0	2.2	2.4
Household income [##]	3.1	3.1	3.0	3.1	3.1	3.0	3.4
FCQ [*]: Healthy	2.9	2.9	3.0	**2.9**	**2.6**	2.9	2.8
FCQ: Mood	2.4	2.4	2.4	2.4	2.4	2.4	2.3
FCQ: Convenience	2.9	2.9	2.9	2.9	2.8	2.9	2.8
FCQ: Sensory appeal	3.2	**3.2**	**3.3**	3.2	3.1	3.2	3.1
FCQ: Natural content	2.8	2.8	2.9	2.8	2.6	2.8	2.7
FCQ: Price	3.1	**3.1**	**3.3**	**3.1**	**3.0**	3.1	3.1
FCQ: Weight control	2.7	2.6	2.7	**2.7**	**2.4**	**2.7**	**2.5**
FCQ: Well-known**	2.3	2.3	2.3	2.3	2.3	2.3	2.2
FCQ: Ethical	2.4	**2.4**	**2.6**	2.4	2.3	2.4	2.3
Food Neophobia (FN) ***	32.7	33.0	31.4	**32.2**	**37.1**	32.8	32.3
Social conformity ***	34.8	34.8	34.8	**35.1**	**32.4**	34.9	34.1
Unconventional eating ***	45.7	**44.9**	**49.7**	45.9	43.6	**46.0**	**43.8**

Notes. [#]) Value of Person correlation coefficient between appropriateness and liking. [##]) Refer to Part 1 of Supplementary Material for numerical coding used to calculate mean values for these variables. Higher mean values indicate higher educational attainment, household size and income, respectively. [*]) FCQ = Food Choice Questionnaire factor (1 = 'Not at all important', 4 = 'Very important'). [**]) A translation mistake meant that the FCQ statement for *familiar* meant "well-known," implying also good reputation. [***]) Higher scores equate to higher food neophobia, tendency to conform to social norms and tendency to unconventional eating. [$]) Segment differences were estimated using: a) ANOVA (all quantitative variables), b) Fischer's exact test (gender), and c) Fischer's r-to-z transformation for testing the difference between correlation coefficients.

December 2019 and this dish is popular around Christmas (supposedly eaten by elves).

The results for the breakfast context (Fig. 2a) were different to the lunch and dinner contexts by way of there being no evidence of a positive association between liking and appropriateness (i.e., absence of pattern (2)). For both clusters – *Adaptive* and *Conforming* – F&B items with similar average liking could be appropriate as well as inappropriate. One example from the *Conforming* segment (dark circles) was 'wholemeal bread with jam' and 'pasta salad with feta cheese.' Both were liked (6.5), but opposite in terms of appropriateness (6.0 vs. 1.4). For the *Adaptive* cluster, 'coffee' and 'stewed apples' showed a similar divergence. Both were well liked (6.8), but only 'coffee' was appropriate for breakfast (6.5 vs. 2.8). The lower appropriateness in the *Conforming* segment relative to the *Adaptive* segment was also seen in Fig. 2a. The negative correlation between appropriateness and liking (r = −0.17; Table 2) in the *Conforming* cluster was not significant (p = 0.4).

Overall, the results confirmed that perceived appropriateness for F&B items can vary almost independently of liking (referred to as pattern (1)), but also that a strong positive relationship can exist (referred to as
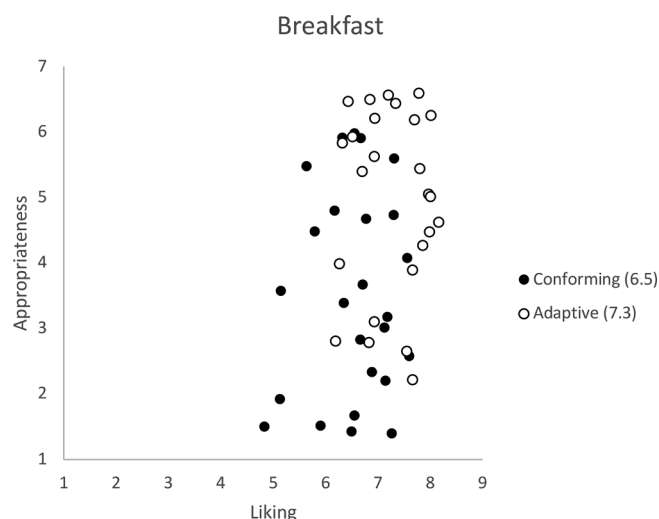
Fig. 2. Results for Study 1 (Denmark) (Obj. 2). Scatter plots of mean values for stated liking (1 = 'dislike extremely', 9 = 'like extremely') against appropriateness (1 = 'not at all appropriate', 7 = 'very appropriate') showing data from two appropriateness-based consumer segments for 25 food and beverage (F&B) items in each of three eating occasions ("breakfast," "lunch" and "dinner"). The values shown between brackets in the legends is the mean for stated liking across the 25F&B names.
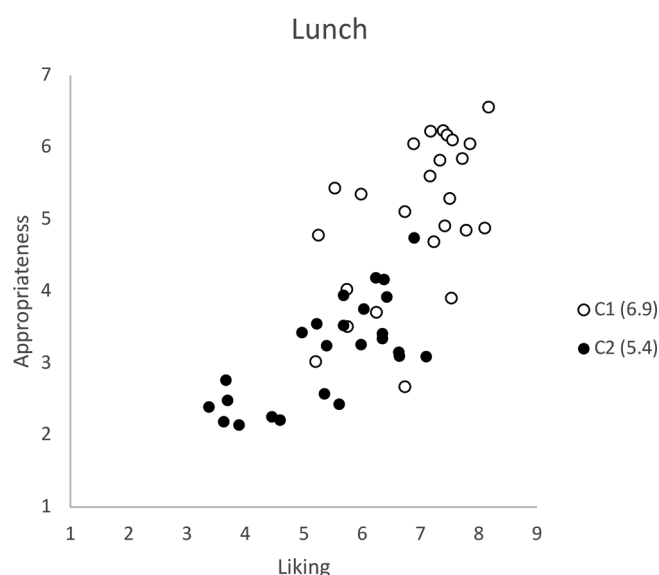
Fig. 2. (*continued*)

patterns (2)). Such duality could generally be seen within clusters, although with variable clarity.

3.3. DK: Segment characterisation – consumer variables

The consumer profiles for the main clusters in each of the three eating occasions, are shown in Table 2, and with the exception of the C2 segment in the lunch context the foremost results linked to Objective 3 was that these profiles were quite similar.

A general finding was a difference between the segments in regard to tendency toward unconventional eating as captured through a 10-item composite measure (e.g., "Once in a while, I think it is okay to have cereal for dinner," and "I follow the social conventions about what foods should be eaten for breakfast, dinner and lunch"). The average scores were higher among situationally adaptive consumers (Table 2). This, however, did not extend to tendency to social conformity in
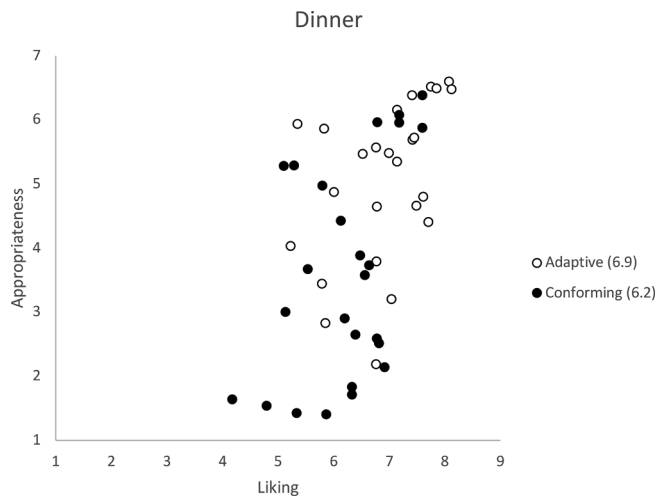
Fig. 2. (*continued*)

general. There were a few differences in importance attached to different food choice motives, but no apparent pattern that differentiated *Adaptive* and *Conforming* consumer segments (Table 2). The C2 cluster in the lunch is considered separately since it was neither *Adaptive* nor *Conforming*, but rather seemed to be more strongly driven by F&B likes and dislikes. Participants in this small cluster (n = 83) were more likely to be male than their C1 counterparts, and they were also less educated. They placed less importance on health and weight control as food choice motives than the average participant, and were more food neophobic. Their level of general social conformity was lower than in C1, as were their tendency for unconventional eating habits. These traits seemed to fit well with the interpretation of C2 being a cluster of people that were more strongly driven by personal food preferences than societal expectations about what is appropriate in different eating situations.

4. Results for Study 2: New Zealand

In a similar manner to Study 1, the results are presented by research objective and closely follow the reporting style of Jaeger et al. (2019), hereby providing a point of reference for determining whether or not replication and extension was achieved.

4.1. NZ: Clusters with varying patterns of situational appropriateness (Obj. 1)

Within eating occasions, 2-way ANOVA using product, cluster membership and their interaction as fixed factors always established highly significant effects (p < 0.001).

The patterns of appropriateness ratings confirmed the existence of *Adaptive* and *Conforming* consumer segments in four of six eating occasions: "breakfast-time," "lunch-time," "dinner-time," and "children's 7th birthday party." This is seen in Fig. 3 (a to d), where the lines for the *Adaptive* and *Conforming* segments have a similar starting point at the left-hand side of the figure, signifying agreement among all participants that the F&B item is highly appropriate for the occasion (e.g., 'Thai green curry' for dinner and 'sausage rolls' for a 7th birthday party). From here the lines diverge and those for the *Adaptive* segments (dotted lines with white circles) lie above those for the *Conforming* segments (solid lines with black circles) conveying higher average perceived appropriateness of the F&B items within an eating occasion. In some instances, the lines for the *Adaptive* segments also slope less steeply towards lower appropriateness than those for the *Conforming* segments (e.g., Fig. 3a), and the overall interpretation is that consumers in the *Adaptive* segments perceive a larger number of F&B items as more appropriate for a focal eating occasion. The proportion of consumers in

the *Adaptive* and *Conforming* segments were different for the four occasions, with only a minority (20%) being classified as *Adaptive* for "children's 7th birthday party" compared to 59% in the lunch occasion. The dinner occasion was more similar to "children's 7th birthday party" in the sense of fewer people being classified as situationally *Adaptive* (30%), and the breakfast occasion was more similar to the lunch occasion in a higher proportion of people being situationally *Adaptive* (48%).

Cluster names referencing situational adaptive or conforming response patterns were not suitable for two of the six occasions – "healthy breakfast" and "when feeling blue." In these two instances, nutritional beliefs and personal taste preferences, respectively, seemed to better describe the results cluster differences. Fig. 3e shows the responses for "healthy breakfast" and the two segments (C1 and C2), where compared to the other eating occasions, differences in situational appropriateness were smaller (5.3 vs. 4.5) and the patterns not readily explained by a lesser/greater conformity to social norms. With the exception of 'Coco Pops', the cluster differences seemed to be linked to different beliefs about what a healthy breakfast constitutes and in C2 (45% of participants), items with sweetness or fat ('porridge with maple syrup and sunflower seeds,' 'fresh fruit salad with custard yoghurt' and 'baked beans on buttered white toast') were less positively regarded. In the case of "when feeling blue," a small proportion of participants (n = 21, 5%) formed a male-dominated cluster where appropriateness was low for all tested F&B items, and in particular 'ice cream,' 'potato chips,' and 'candy/sweets' (Fig. 3f; < 3 of 7). In the main cluster (C1), appropriateness was high (> 5 of 7) for all items except 'cereal/muesli,' and different preferences seemed to account well for these cluster differences.

4.2. NZ: Segment characterisation – Relationship with liking (Obj. 2)

Significant differences in hedonic responses between F&B items within eating occasions was confirmed initially (p < 0.001 for all eating occasions), and none of the F&Bs were disliked, on average (the lowest mean score was 5.0 ('neither like nor dislike') and obtained for 'sugar-free cake without icing' in "children's 7th birthday party"). The range of hedonic scores was smallest for the dinner occasion (7.1 to 7.9) and largest for the lunch occasion (5.5 to 7.8). Two-way ANOVA also confirmed significant cluster differences in all eating occasions, and the interaction between product and cluster membership was significant with the exception of "dinner-time."

With regard to Obj. 2, the results confirmed that perceived appropriateness for F&B items can vary almost independently of liking. This was most evident for breakfast and dinner occasions (Fig. 4a), where aggregate-level mean appropriateness ratings varied from 2.1 to 6.1 and from 2.4 to 6.7, respectively, while stated liking was confined to a more narrow range (6.7–7.8 and 7.1–7.9 for the breakfast and dinner occasions, respectively). For two occasions – "lunch-time" and "children's 7th birthday" – there was some evidence of a dual liking-appropriateness pattern that (1) encompassed the results seen for the breakfast and dinner occasions, and (2) portrayed a relationship whereby less liked F&B items were perceived as less appropriate (Fig. 4a). To illustrate, consider "children's 7th birthday" where three F&B items had average liking scores between 6.0 and 6.2, but appropriateness varied between 2.9 ('venison salami') and 5.3 ('marmite and cheese sandwich') with 'apple and kale juice as an intermediary (3.9). This represented pattern (1) described above, while (2) was exemplified by 'sausage rolls' which were well liked and regraded as very appropriate (7.1 and 6.2, respectively) whereas 'raw cauliflower with dip' was less liked and less appropriate (5.7 and 3.2, respectively). In the case of "healthy breakfast" (Fig. 4b), there was little evidence of disassociation between liking and appropriateness, and rather F&B items that were most liked were also most appropriate (and *vice versa*). The very restricted hedonic range for the "when feeling blue" occasion meant that it was difficult to clearly discern the relationship with
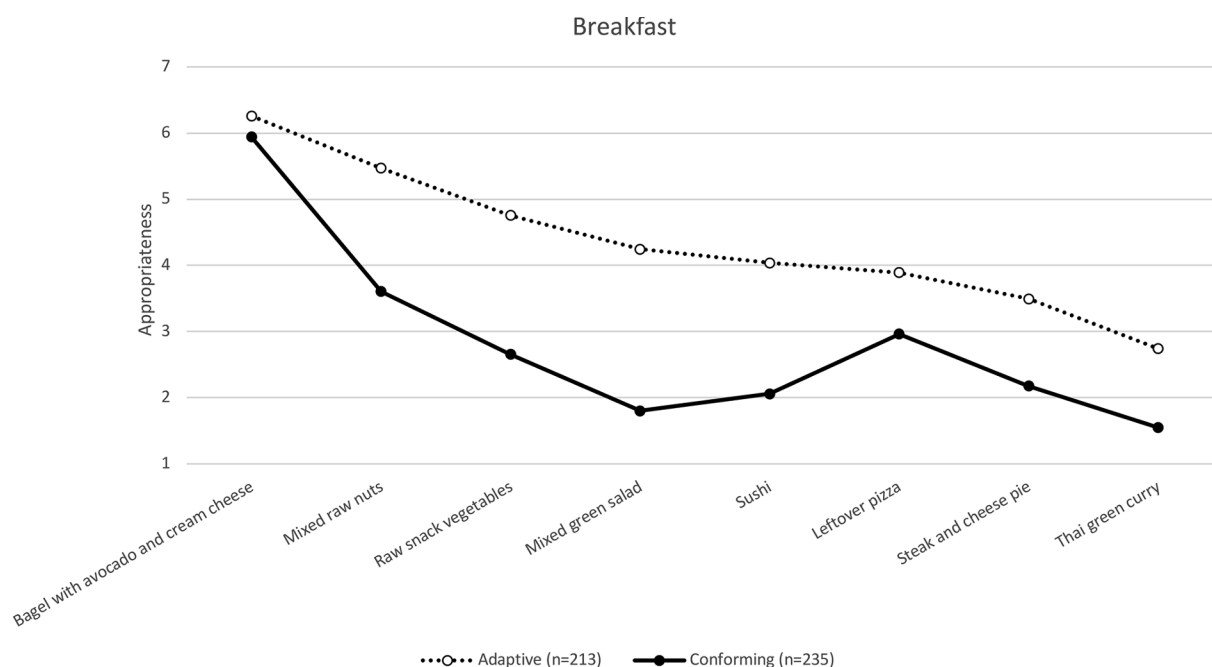
Fig. 3. Results for Study 2 (New Zealand) (Obj. 1). Line plots for consumer segments showing mean values for appropriateness (1 = 'not at all appropriate', 7 = 'very appropriate') for each of 8 food and beverage (F&B) items in each of six eating occasions, where: **(a)** "breakfast-time," **(b)** "lunch-time," **(c)** "dinner-time," **(d)** "children's 7th birthday party," **(e)** "healthy breakfast," and **(f)** "when feeling blue." The number of consumers in each segment (n) is shown in the legend between brackets.

appropriateness. Visually, pattern (2) seemed to fit, but it was also seen, fitting with (1) that 'coffee' and 'cereal/muesli' were similar liked (7.2), but the latter was regarded as much less appropriate (5.1 vs. 3.3, respectively).

Progressing from aggregate-level analyses to segment-based analyses, the results for "adaptive" and "conforming" consumers in four eating occasions – the three main daily eating occasions and 7th birthday party are shown in Fig. 4c and 4d, respectively. The plot for *Adaptive* consumers showed the expected higher appropriateness scores, but no strong relationship between liking and appropriateness, and a dual relationship such as seen in Fig. 4a was not easily discernible in

Fig. 4c. In the situationally *Conforming* segments, the disassociation between liking and appropriateness was clearly seen, notably for hedonic scores in the 7 to 8 range, where mean appropriateness span nearly the full scale from 1 to 7. For less liked F&B items, appropriateness was generally lower in a manner fitting with pattern (2). Overall, lower perceived appropriateness of the F&B items relative to *Adaptive* consumers was a notable difference between Fig. 4c and 4d.

4.3. NZ: Segment characterisation – consumer variables (Obj. 3)

There were some minor differences between the clusters on the
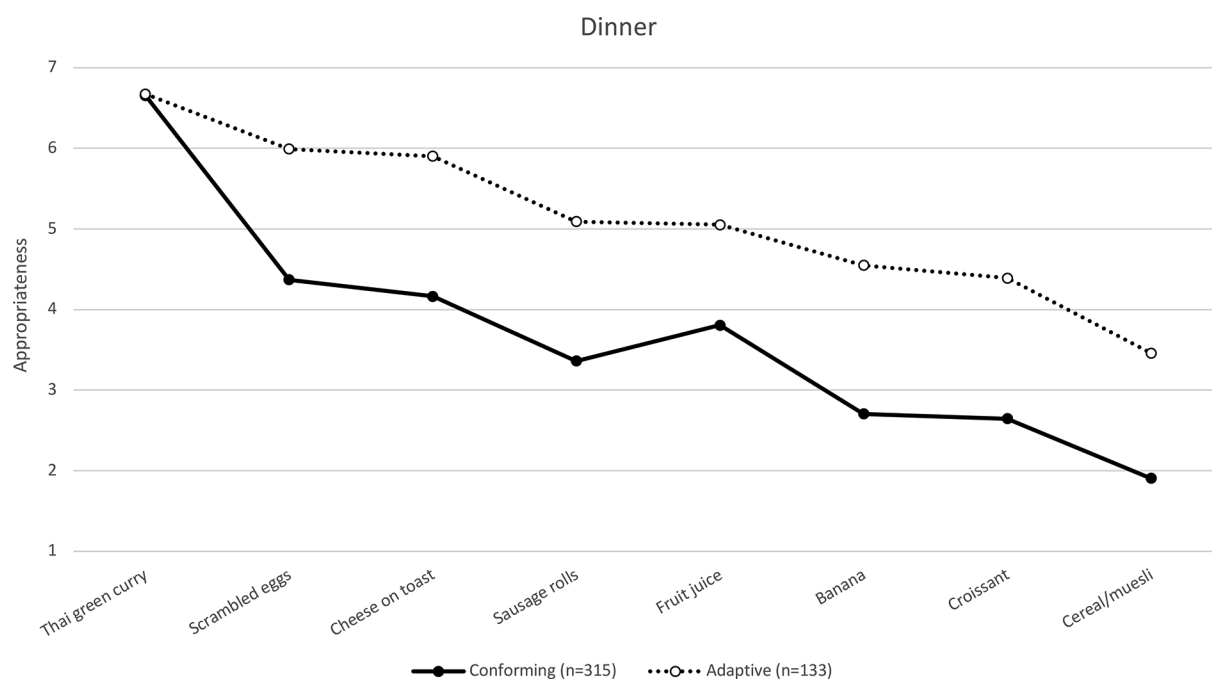

Fig. 3. (*continued*)

Dinner
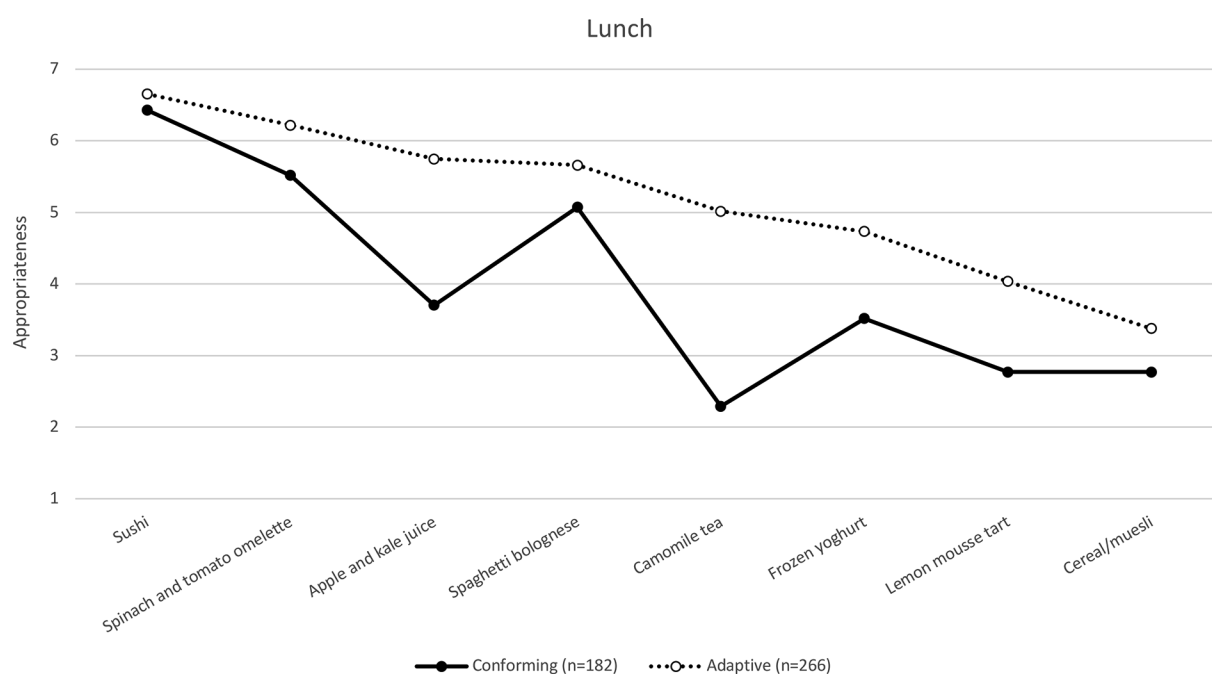
Fig. 3. (*continued*)

included consumer variables (Table 3).

For the three main three daily eating occasions, the age, gender, income and household size distributions were not statistically different for the *Adaptive* and *Conforming* consumer segments. In terms of importance of factors for daily food choice decisions, the results differed between the eating occasions. For breakfast-time, the average ratings were higher in the *Adaptive* than the *Conforming* segment for six FCQ factors: health, mood, natural, price, weight control, and ethical, although differences in mean importance scores were not large. Importance of ethical food choice motives were also higher among *Adaptive* than *Conforming* consumers in the lunch-time and dinner-time eating occasions, and finally convenience was a more important motive for *Adaptive* consumers in the dinner-time occasion. Degree of food

neophobia and social conformity did not differ between the clusters.

The three new eating occasions were considered in turn. The proportion of women was higher in the *Adaptive* segment for the occasion "children's 7th birthday party," and consumers in this segment, relative to those in the *Conforming* segment, also placed greater importance on health, mood, natural content and ethical motives in food choices. The C2 cluster in "healthy breakfast" comprised more older consumers than did the C1 segment for this context. They (C2) placed greater importance on six food choice factors: health, mood, natural, price, weight control, and ethical. The small C2 segment (n = 21) established for the "when feeling blue" occasion differed to the main consumer group by placing greater importance on price and less importance on mood in food choice decisions. For all three "new" occasions, social conformity
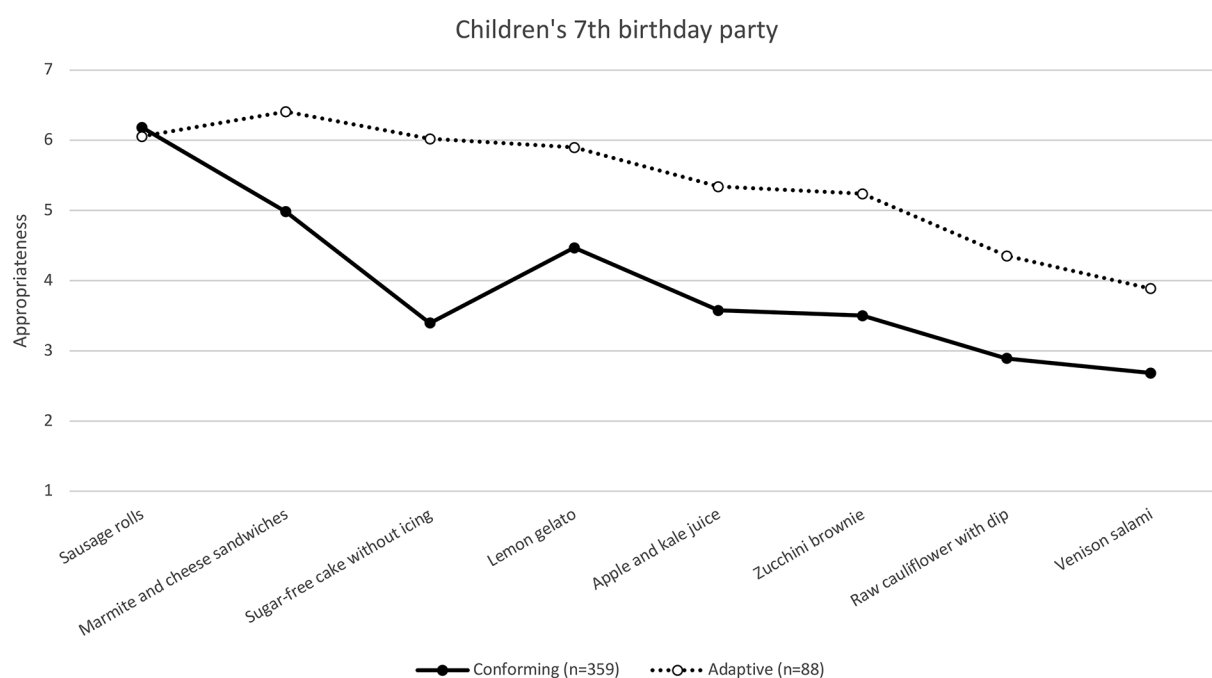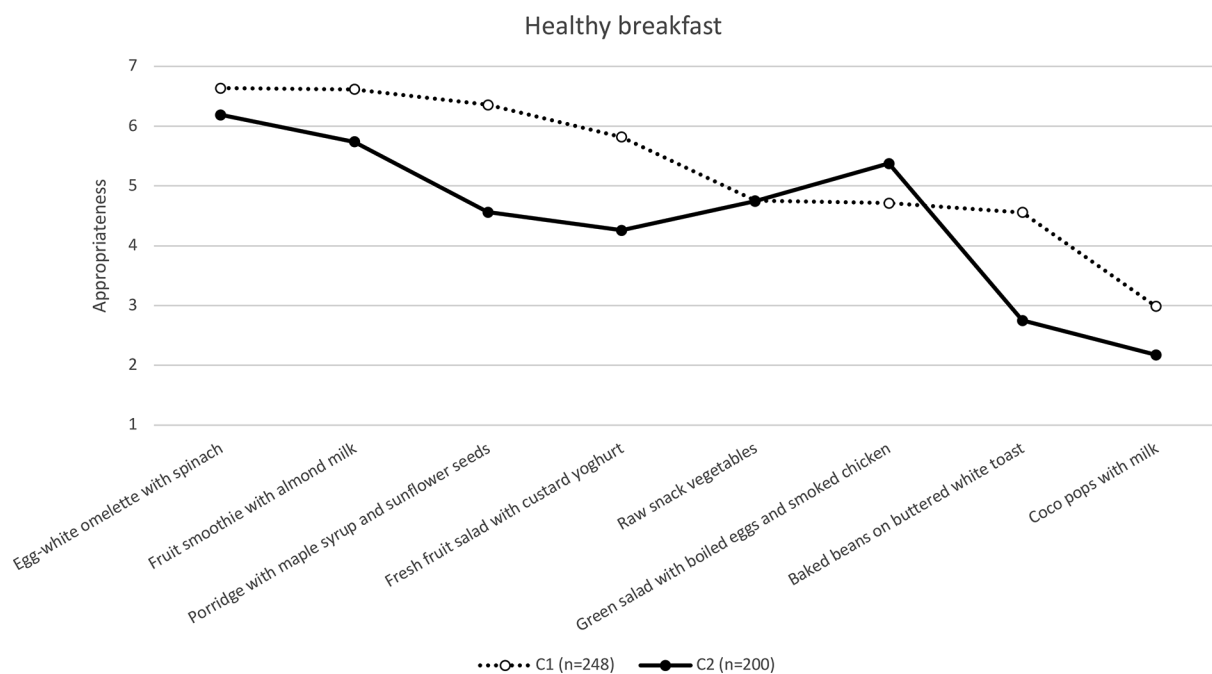
Children's 7th birthday party

Fig. 3. (*continued*)

Healthy breakfast

C1 (n=248)   C2 (n=200)

Fig. 3. (*continued*)

did not significantly differ between clusters, and food neophobia was only significant for "when feeling blue" where the average score was higher in the small C2 segment.

5. Discussion

### 5.1. Consumer segmentation based on situational appropriateness ratings

Objective 1 pursued replication of the appropriateness-based consumer segments found by Jaeger et al. (2019) with Australian consumers.

5.1.1. Three main daily eating occasions

The three daily main eating occasions (Obj. 1a) are considered first, and for Study 1 (Denmark) some evidence of replication in the form of situationally adaptive and conforming segments was found. Specifically, these segments existed in the dinner context (Fig. 1c), probably in the breakfast context (Fig. 1a), but not in the lunch context (Fig. 1b). In Study 2 (New Zealand), *Adaptive* and *Conforming* segments were confirmed for eating occasions taking place at breakfast-time, lunch-time and dinner-time (Fig. 2a to 2c). Collectively these results constitute partial replication.

The biggest divergence between Jaeger et al. (2019) and the present study was for the lunch context in Study 1 (Denmark). Two clusters were established, and cautiously we label the large C1 segment (89%)

When feeling blue

C1 (n=427)   C2 (n=21)

Fig. 3. (*continued*)
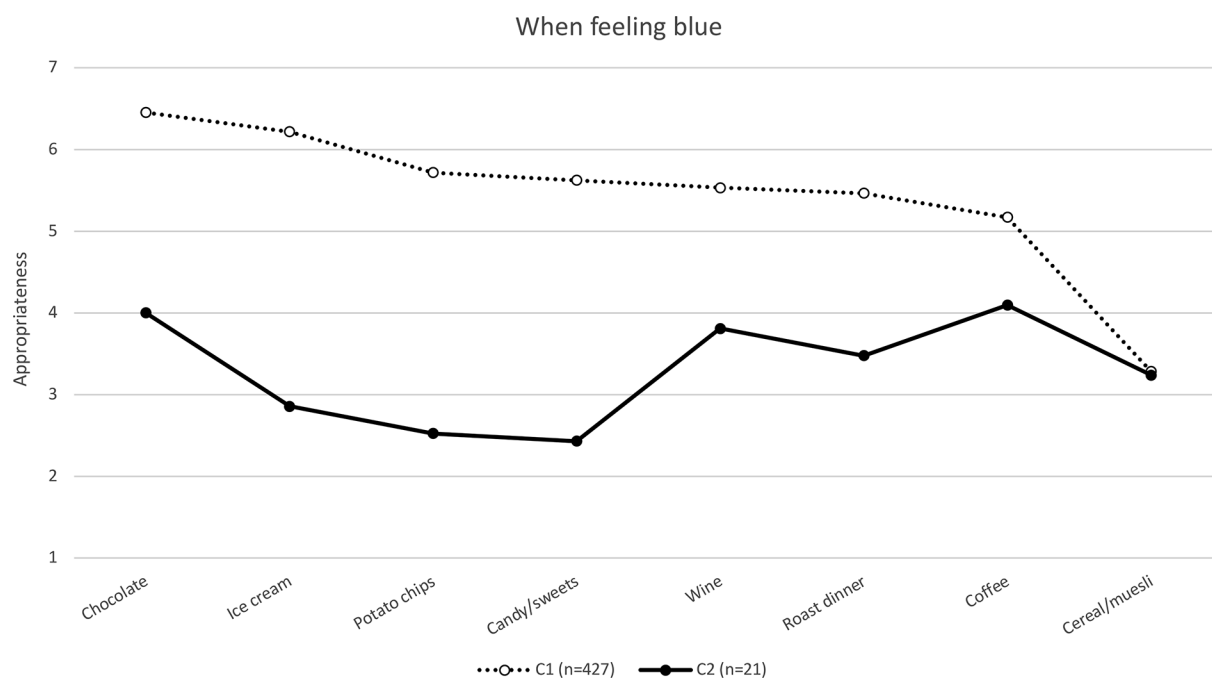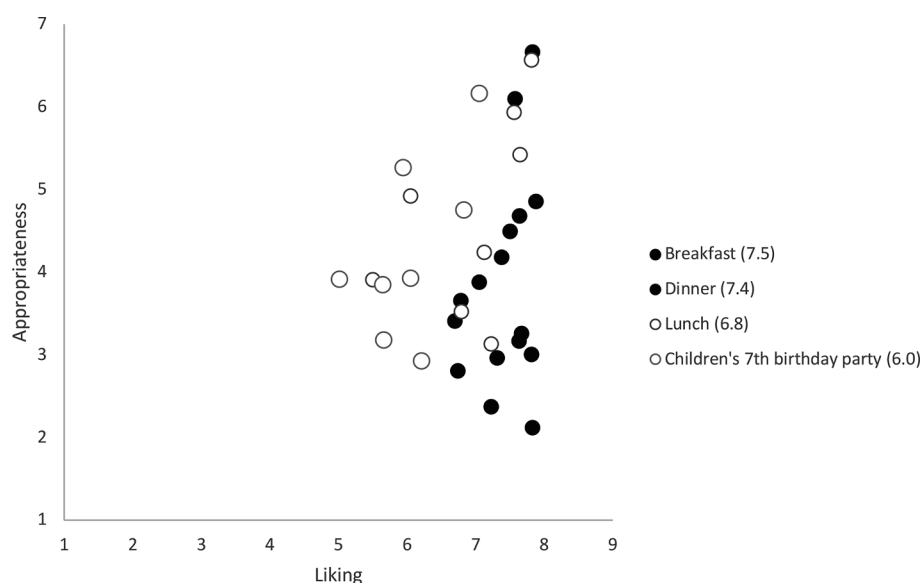
Fig. 4. Results for Study 2 (New Zealand) (Obj. 2). Scatter plot of mean values for stated liking (1 ='dislike extremely', 9 ='like extremely') against appropriateness (1 ='not at all appropriate', 7 ='very appropriate') as follows: **(a)** Aggregate-level (n = 448) responses for four occasions – "breakfast-time," "lunch-time," "dinner-time," and "children's 7th birthday party" with 8 data points per occasion, **(b)** Aggregate-level (n = 448) responses for two occasions – "healthy breakfast," and "when feeling blue" with 8 data points per occasion, **(c)** Responses for four occasions – "breakfast-time," "lunch-time," "dinner-time," and "children's 7th birthday party" with 8 data points per occasion for the situationally *Adaptive* consumer segments, and **(d)** Responses for four occasions – "breakfast-time," "lunch-time," "dinner-time," and "children's 7th birthday party" with 8 data points per occasion for the situationally *Conforming* consumer segments. For 4a and 4b, the values shown between brackets in the legends is the overall mean for stated liking. For 4c and 4d, the number of consumers in each segment is shown in Fig. 3.

as *Adaptive* since the appropriateness profile in this cluster seemed more characteristic of what would be expected from situationally adaptive than situationally conforming consumers in the sense that most of the F &B items were regarded as appropriate for lunch. A possible explanation could be that many Danish workplaces have employee canteens where a broad range of items are often available (hot and cold, sit-down and grab-and-go) (Haugaard & Lähteenmäki, 2017). This exposure, possibly in combination with a tradition for more elaborate family lunches at weekends (Lund & Gronow, 2014) could explain why so many participants regarded most F&B items included in this context as appropriate. The second and much smaller cluster did not represent situationally conforming response pattern, but rather appeared to be

driven by (lack of) liking for the F&B items. The correlation between liking and appropriateness was strong (r = 0.71), but overall liking was considerably lower than in the other clusters (5.4 vs. 6.2–7.3).

Differences in relative sizes of *Adaptive* and *Conforming* clusters was another reason we consider the present research to only constitute partial replication of Jaeger et al. (2019). In their initial study, Jaeger et al. (2019) found that the *Adaptive* segment was smallest for the dinner context (38.4%), and this was also the case in Study 2 (NZ; 29.7%) but not in Study 1 (DK; 83.7%). For the lunch context, the *Adaptive* and *Conforming* segments were evenly sized in Jaeger et al. (2019), while there was a slight dominance of *Adaptive* consumers in Study 2 (59.4%) and a large dominance in Study 1 (89.3%). For the
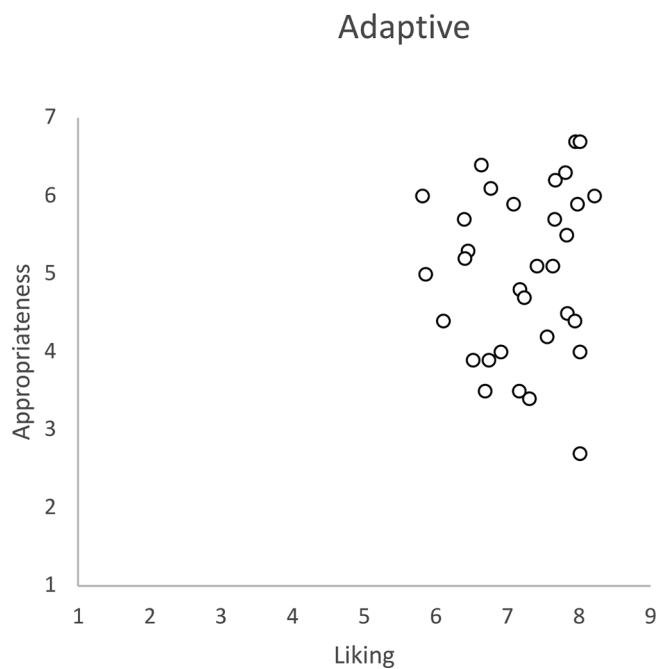
Fig. 4. (*continued*)
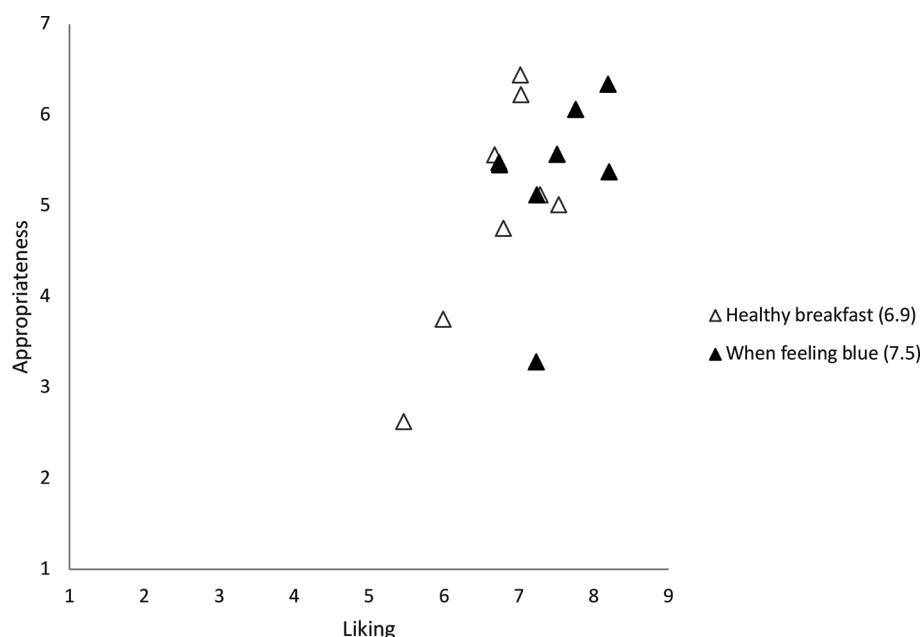
Adaptive

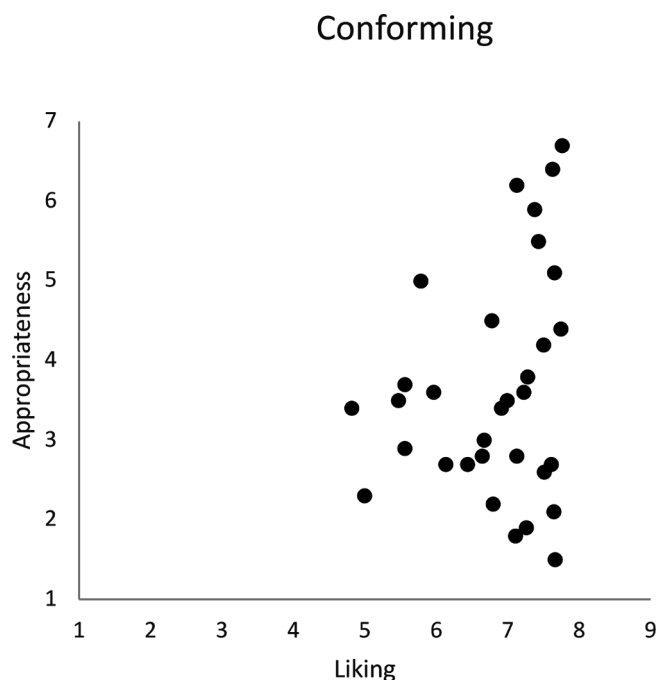**Fig. 4.** (*continued*)

Conforming

Fig. 4. (*continued*)

breakfast context, it was again the case that the *Adaptive* and *Conforming* segments were about evenly sized in New Zealand (Study 1) and Australia (Jaeger et al., 2019), whereas in Denmark (Study 1) only 16.5% of participants were classified as *Adaptive*. It seems reasonable that such differences could occur and be an expression of cross-cultural differences. Degree of cultural homogeneity could be one reason why differences were found between Denmark on one hand, and Australia and New Zealand on the other hand. Not only are New Zealand and Australia culturally similar to each other and different to Denmark (Hofstede Insights, 2020). These two countries are also more ethnically and culturally diverse than Denmark, which remains a very homogeneous society (Athanasiadis et al., 2016; Hedetoft, 2006; see also Jenkins, 2011).

Overlap in a few F&B items allowed for some comparison between Study 1 and Study 2, and an exploratory gaze at cross-cultural differences. For the breakfast context there was communality between the two studies in appropriateness ratings for 'raw snack vegetables', 'sushi' and 'Thai food,' being higher in the *Adaptive* than *Conforming* clusters (Fig. 1a and 2a, respectively). The only large difference was seen for 'raw snack vegetables' which was regarded as more appropriate in Study 1, and this seemed to fit with snacking on vegetables such as carrots, tomato, and cucumber being common in Denmark (Pedersen et al., 2015) and widely promoted as part of a healthy and balanced diet (e.g., Søndergaard and Edelenbos, 2007). For the lunch context, appropriateness ratings in the *Adaptive* cluster (Study 2) and the C1 cluster (Study 1) were very similar for 'spinach and tomato omelette' (6.2 and 6.1, respectively) and for 'spaghetti Bolognese' (5.1 and 4.9, respectively). Building on the findings from the breakfast occasions this pointed to a degree of cross-cultural similarly in perceived appropriateness, and also supported the interpretation of C1 representing situationally adaptive consumers. For the dinner contexts, the results for 'banana' were also very similar in the two studies with higher ratings in the *Adaptive* segments (4.4 and 4.5 for Study 1 and Study 2, respectively), which were higher than the ratings in the *Conforming* segments (2.1 and 2.7 for Study 1 and Study 2, respectively).

Overall, we conclude that the results for the three daily main eating occasions (Obj. 1a) provide partial replication for Jaeger et al. (2019) in the sense that appropriateness-based consumer segments appear to exist more generally, both in regard to individual eating occasions but also for certain F&B items. However, in addition to this cross-cultural similarity, there is also some evidence of cross-cultural differences in the sense that the consumer segments manifest in ways that fit with norms regarding eating and drinking in individual countries.

5.1.2. Eating occasions and F&B items

Study 2 extended Jaeger et al. (2019) by including three new eating occasions (Obj. 1b): "children's 7th birthday party," "healthy breakfast" and "when feeling blue." The results mirrored those for Objective 1a in the sense that there was partial support for the existence of *Adaptive* and *Conforming* consumer segments based on appropriateness ratings. The evidence was compelling only in the case of "children's 7th birthday party" (Fig. 2d), which fitted with this occasion being governed by strong social norms (Lee et al., 2009), whereas "healthy breakfast" and "when feeling blue" are occasions where decisions about what to eat and drink are largely driven by personal beliefs and preferences (Provencher & Jacob, 2016; Spence, 2017a, 2017b; Wansink, Cheney, & Chan, 2003). What is unclear from the present research is how widely *Adaptive* and *Conforming* consumer segments exist. As argued in our previous work on the topic, consumers are more or less likely to refer to common norms (vs. make idiosyncratic choices) depending on the existence of situational cues pointing at "normal" behaviour and of (dis) incentives to follow it (Giacalone & Jaeger, 2019a). Therefore, a hypothesis could be that *Adaptive* and *Conforming* segments are more likely observable for eating occasions that are more rigidly defined by cultural norms (e.g., wedding, major birthday), or where pressure to conform to dominant social paradigms exist (e.g., eating in the workplace). If work continues with new eating occasions, it may be prudent to increase the number of F&B stimuli to make it more similar to Study 1. This will likely increase the observed range in appropriateness ratings and ease of finding evidence for/against replication since the patterns would be based on more observations. The criteria guiding F&B selection could also be revised to ensure that they include, for example, hedonic vs. utilitarian factors, and could be relevant in some contexts including "when feeling blue" in the present study.

The selection of F&B items was made to be culturally appropriate for Denmark and New Zealand and invariably this extended Jaeger et al. (2019) to new F&B items (Obj. 1c). At a first glance, it appeared curious that the iconic Danish pastry was rated as being inappropriate by Danish consumers (Fig. 1). The data from Study 1 show that 'Danish

Table 3

Results for Study 2 (New Zealand, n = 448) (Obj. 3). Profiling of consumer segments based on appropriateness (1 = 'not at all appropriate'; 7 = 'very appropriate'), stated liking (1 = 'dislike extremely'; 9 = 'like extremely') and participant characteristics (mean values unless otherwise indicated) for the aggregate sample and appropriateness-based consumer segments in each of six eating occasions. The abbreviations A and C refer to *Adaptive* and *Conforming* appropriateness-based consumer segments, respectively. C1 and C2 refer to Cluster 1 and Cluster 2. Within each eating occasions, where significant differences between the consumer segments[$] were found at the 5% level, bold font is used.

Eating occasion		Breakfast-time		Lunch-time		Dinner-time		Children's 7th birthday [$]		Healthy breakfast		When feeling blue	
Segment name	Aggregate	A	C	A	C	A	C	A	C	C1	C2	C1	C2
Segment size	*448*	*213*	*235*	*266*	*182*	*133*	*315*	*88*	*359*	*248*	*200*	*427*	*21*
Appropriateness	4.5	**4.4**	**2.8**	**5.2**	**4.0**	**5.1**	**3.7**	**5.4**	**4.0**	**5.3**	**4.5**	**5.4**	**3.3**
Stated liking	7.0	**7.5**	**7.1**	7.1	6.8	7.8	7.4	**6.5**	**6.0**	**6.9**	**6.5**	7.5	6.9
Correlation (means)[#]	0.43	**0.19**	**0.00**	**0.33**	**0.69**	**0.70**	**0.48**	**0.25**	**0.65**	**0.69**	**0.84**	**0.38**	**0.61**
Correlation (raw scores)[#]	0.30	0.25	0.19	**0.23**	**0.41**	0.30	0.20	0.40	0.41	0.34	0.32	0.40	0.17
Female (%)	53.3	50.2	56.2	55.6	48.4	53.4	53.3	64.8	50.7	54.8	51.5	54.3	33.3
Age (years old)	43.1	42.1	44.1	44.0	41.9	43.4	43.0	42.3	43.3	**46.0**	**39.6**	43.1	44.8
Household size [##]	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
Household income [##]	4.5	4.3	4.7	4.4	4.6	4.4	4.6	4.4	4.5	4.5	4.6	4.6	3.6
FCQ *: Health	5.5	**5.7**	**5.3**	5.6	5.4	5.6	5.5	**5.9**	**5.4**	**5.7**	**5.3**	5.5	6.1
FCQ: Mood	4.4	**4.6**	**4.1**	4.4	4.3	4.5	4.3	**4.7**	**4.3**	**4.5**	**4.2**	4.4	3.6
FCQ: Convenience	5.0	5.1	5.0	5.0	5.1	**5.6**	**4.8**	5.2	5.0	5.1	4.9	5.0	5.3
FCQ: Sensory appeal	5.9	6.0	5.8	5.9	5.8	6.0	5.9	6.1	5.9	**6.1**	**5.7**	5.9	6.1
FCQ: Natural content	4.8	**5.0**	**4.6**	4.9	4.6	4.8	4.8	**5.4**	**4.6**	4.9	4.6	4.7	5.5
FCQ: Price	5.8	**5.9**	**5.6**	5.9	5.6	5.9	5.7	5.9	5.7	**5.9**	**5.6**	**5.7**	**6.6**
FCQ: Weight control	4.8	**5.0**	**4.7**	4.9	4.8	5.0	4.8	5.3[a]	4.7[b]	**5.0**	**4.6**	4.8	5.2
FCQ: Familiar	4.0	4.1	3.9	4.0	4.1	4.1	4.0	4.3	3.9	4.1	3.9	4.0	4.7
FCQ: Ethical	4.2	**4.4**	**4.0**	**4.3**	**4.0**	**4.4**	**4.1**	**4.7**	**4.1**	**4.3**	**4.0**	4.2	4.4
Food Neophobia (FN) **	24.8	24.6	25.0	24.5	25.3	24.5	24.9	25.5	24.6	24.5	25.1	**24.6**	**28.7**
Social conformity **	35.3	35.3	35.3	35.5	35.0	35.7	35.2	36.1	35.1	35.7	34.9	35.3	35.8

Notes. [#]) Value of Person correlation coefficient between appropriateness and liking. [##]) Refer to Part 4 of Supplementary Material for numerical coding used to calculate mean values for household size and income. *) FCQ = Food Choice Questionnaire factor (1 = 'not at all important', 7 = 'very important') Values based on 421 observations. **) Higher scores equate to higher food neophobia or tendency to conform to social norms. [$]) Only 447 participants completed this context. [$]) Segment differences were estimated using: a) ANOVA (all quantitative variables), b) Fischer's exact test (gender), and c) Fischer's r-to-z transformation for testing the difference between correlation coefficients.

pasty' is well liked, but since it is also unhealthy it is generally a treat reserved for occasional consumption, for example, shared morning or afternoon tea at work, or weekend breakfast/brunch. Jaeger et al. (2019) showed that specifying whether breakfast was weekday or weekend altered appropriateness ratings among New Zealand consumers. The same would be expected for Danish consumers, especially considering that breakfast is a fast meal during weekdays to be ready for work/school start around 8am, and perhaps there as many places this meal is increasingly eaten outside the home (Spence, 2017b).

Reports of rigidity in breakfast consumption practices acting as a barrier to uptake of more nutritious breakfast eating habits among US consumers (Bian and Markman, 2019) point to there being value in extending the present research for the breakfast eating occasion to additional F&B items. Considering that breakfast meals in many parts of the world are nourishing and similar to dinner foods a more in-depth exploration of situationally-based consumer segments for this eating occasions could be performed to understand how this meal can be re-defined in consumers' minds and drawing on *Adaptive* people to act as early adopters and trend setters with a view to spear-heading wider societal change. Denmark seems a more obvious candidate for such attempts considering that ~80% of participants were classified as *Conforming*. Celebrities and social influencers could be used as spokes people as is common in advertising (Tran, Yazdanparast, & Strutton, 2019).

5.2. Relationships between situational appropriateness and liking

The findings from Studies 1 and 2 collectively confirm that situational appropriateness can be either uncorrelated or positively correlated to liking – patterns (1) and (2), respectively. This is seen in Figs. 2 and 4, and from the values of the correlation coefficients between these two variables. Therefore, in the case of Objective 2, the results from Jaeger et al. (2019) were replicated.

The results from the present research contributed greater understanding of when the appropriateness-liking relationship more closely fits pattern (1) where appropriateness and liking are independent, and when it fits pattern (2) where low appropriateness corresponds to low liking. A positive correlation seems more likely when the eating occasion is more strongly guided by personal beliefs and opinions (Fig. 2e and 2f) and when a consumer segment is strongly preference driven, probably displaying "low" liking for the F&B names being investigated (Fig. 1b). With Australian consumers, Jaeger et al. (2019) also described minor clusters where appropriateness responses appeared to be driven predominantly by preferences than situational norms. The prevalence of pattern (1), when jointly considered with the range of hedonic values reported in both of the present studies (> 5 on a 9-pt hedonic scale), further supports the conclusion put forth in Jaeger et al. (2019) that appropriateness measures are most useful when comparing a set of products that are liked, and more similarly liked, versus ones with large expected differences in degree of liking/disliking. The results for individual eating occasions is likely directly related to the tested F&B items. For example, in the case of a 7th birthday party (Study 2), where pattern (1) was dominant, we expect to have been able to also find evidence of pattern (2) by inclusion of different F&B items. For example, had the study included 'cup cakes with icing,' 'chocolate ice cream,' and 'strawberries,' these would likely have been viewed as very situationally appropriate, in addition to being well liked. However, other well liked F&B items, such as 'cereal/muesli' and 'scrambled eggs' would be much less appropriate.

It was not apparent that the appropriateness-liking relationship differed largely for *Adaptive* and *Conforming* consumer segments, at least not with respect to the strength of the relationship. Lower appropriateness ratings among *Conforming* consumers was clearly seen (Figs. 2 and 4), but it was not seen, for example, that *Conforming* consumers inferred appropriateness based on lower liking.

A point to consider for future research is the possible conflict

between measuring liking in general and not specific to situational context. Our approach followed Schutz with whom situational appropriateness as a adjunct to acceptability originated (Schutz & Jaeger, 2010), but since liking is situationally influenced, as least in part, it would be prudent to explore the association between liking and appropriateness when the latter is situationally specific. The difference in the two response can be captured by an example – "overall, how much do you like cereal?" vs. "how much do you like cereal, when eaten at dinner time?" We expect that the latter would be more strongly corelated with appropriateness than the former, but require empirical confirmation.

5.3. Profiling of consumer segments

The final part of the research sought replication of the patterns of participant characteristics in *Adaptive* and *Conforming* consumer segments based on appropriateness ratings (Obj. 3). Jaeger et al. (2019) found that these clusters were similarly composed with regard to age, gender, household size and household income. This was also the case in the present research.

With respect to motives for daily food choice decisions, some significant differences were uncovered and generally they were associated with smaller rather than larger effects. The most notable pattern was a similarity between Study 2 (New Zealand) and Jaeger et al. (2019) who used Australian consumers. There was a tendency for the factors mood and ethical concerns to be regarded as more important in the *Adaptive* clusters. With regard to mood ("feeling good") as a food choice motive, a possible explanation links to hedonism (i.e., valuing pleasure) which may be more strongly expressed in *Adaptive* than *Conforming* consumers and lead them to follow their mood and "eat what I felt like at the time." Why greater importance would be placed on ethical factors by *Adaptive* consumers is not immediately clear, other than paying less attention to societal norms about eating and drinking frees people up to be more strongly driven by other food choice motives. In general, all differences between the segments with regards to food choice motives were small, which was also the case in Jaeger et al. (2019). Previous research has suggested that consumers' food choice motives can themselves be affected by the situation (Machín et al., 2014). Thus, as previously observed regarding liking, it is possible that asking consumers about food choice motives with reference to the specific situations, rather than in general, could have led to the identification of larger differences between segments.

A composite measure of unconventional eating was included in Study 1 and significant differences between *Adaptive* and *Conforming* consumers were in the expected direction. In Jaeger et al. (2019), the same measure was not useful in differentiating between these two types of appropriateness-based segments, and may be linked to differences in the test populations' degree of cultural homogeneity. In future research, additional variables that better explain segment differences should be sought, and inspiration can be found in the Food-Related Lifestyle questionnaire (Brunsø et al., 2004) and the Food Involvement Scale (Bell & Marshall, 2003) with candidate items such as: "in our house, nibbling has taken over and replaced set eating hours," "when I serve a dinner to friends, the most important thing is that we are together," "what we are going to have for supper is very often a spontaneous decision," "I enjoy cooking for others and myself," and "compared with other daily decisions, my food choices are not very important." The first and second statements, for example, would be expected to the more strongly expressed among consumers in the *Adaptive* dinner segment.

The C2 segment (n = 83) in the lunch context of Study 1 appeared to be largely driven by personal preferences, giving low appropriateness ratings to less liked F&B items. This differentiated the C2 segment from the other segments in Study 1, and the difference extended to participant characteristics which were also different to the other segments of Danish consumers (Table 2). C2 was male dominated, less well educated, placed less importance on health and weight control as food

choice motives, more neophobic, less socially conforming and less influenced by social conventions about eating and drinking. Jaeger et al. (2019) uncovered similar segments with some shared participant characteristics (male dominated, less income, higher food neophobia). Tentatively, had the F&B items been tailored to each consumer's personal preferences, it would have been possible to see evidence of disassociation between appropriateness and liking. There is mounting evidence that higher levels of food neophobia is associated with less enjoyment from eating and drinking (Jaeger et al., 2017; Laureati et al., 2018), and it makes sense that if people are driven by a desire to avoid unfamiliar foods their F&B repertoire will be more rigid and less open to trying dishes that are generally considered appropriate for a certain eating occasion. Jaeger et al. (2019) showed the effect of food neophobia on appropriateness, and the data from Study 1 could be used for further exploration to understand whether appropriateness segmentation changes when "neophobic" people are excluded. The lower food neophobia level in the Study 2 (Table 3), which fits with participants being attendees at taste tests in central location tests (Loss et al., 2017) makes this data unsuitable for such an exploration.

5.4. Limitations and suggestions for future research

When using cluster analysis for consumer segmentation, the choice of clustering approach can have a large influence on the outcomes (Berget, 2018). In keeping with a replication research strategy we used the approach from Jaeger et al. (2019), but in Study 1 the clusters were very unevenly sized which reduced the insights gained from the analysis. Additional clustering approaches was attempted, including standardization of raw data, but it had little impact on the conclusions. This suggested that the established appropriateness-based segments were not highly unstable, but this should be further confirmed by internal validation (as per Jaeger et al., 2019). Alternatively, different hierarchical clustering methods such as Ward's could be attempted on both the current data and that of Jaeger et al. (2019) since this method choice is key to the resulting clusters.

More generally, we speculate that the difference between Study 1 (Denmark) and Study 2 (New Zealand) may have to do with cultural homogeneity which is higher in Denmark (Jenkins, 2011. To confirm this, follow-up studies could be performed in another Nordic country which would be expected to be similarly homogenous to Denmark. Alternatively, a very culturally diverse population could be studied, for example, people living in some of the world's most multicultural cities (e.g., Sao Paulo, Singapore, Sydney, Toronto, Amsterdam, London, San Francisco). A comparison of individualistic and collectivist cultures (e.g., USA and China) could be illuminating as there are likely to be stronger norms in collectivist cultures about what is appropriate behaviour in certain situations.

With good reason we chose "replication and extension" as the strategy for the present research. Because of the uncertainty of scientific evidence, reproducibility is regarded as a defining, if not the most important feature of scientific knowledge (e.g., Platt, 1964; Rosenthal & Rosnow, 1984; McCullough & Vinod, 2003). However, there is no single standard for evaluating replication success, there is no single definition of what reproducibility means, and there is more than one way to conduct a replication study (e.g., Open Science Collaboration, 2015; Goodman et al., 2016; Anderson & Maxwell, 2015). We did not attempt an "exact" or "direct" replication, which entails duplication, as closely as possible of the research design (Hubbard & Armstrong, 1994), and prescribes an attempt to replicate the original study with another sample drawn from the same population. From a point of scientific rigour this may have been the preferred starting point, but instead we sought "replication and extension" which generally refers to "duplication of a previously published empirical research project … [that] does not alter the conceptual relationships involved in the original study, but instead tests them by making changes in some aspects of the initial design" (Hubbard & Armstrong, 1994, p. 236). As already discussed,

the limitation of this strategy is that direct comparisons with the initial study is not possible, making it harder to determine why replication fails or is only partial. It is also a weakness that the replication attempt is by the same group of authors who conducted the initial study and not by an independent research team. The latter is regarded as more convincing (e.g., Creusen & Schoormans, 1997; Nosek et al., 2015) as also captured by the perspective that less scientific value will be associated with N replication studies by one group of researchers than N replications, each conducted by different researchers/teams (Rosenthal & Rosnow, 1984). In the future we encourage others to think of how their research activities can support the need for replication in science, and suggest that imitative investigations (alternatively, "quasi-replications"; Gangestad & Thornhill, 1999) which seek to determine of consistent patterns emerge across studies appear very suitable in the field of food-related consumer research. They empirically support the results of the original study or give credence to a new one by extending generalizability and working through mistakes, recommendations or weakness of the original study (Bettis et al., 2016).

Being bound to the approach of Jaeger et al. (2019) limited our "freedom to operate." We followed the approach of the original paper which was data driven, which is a common research orientation in product-focused consumer research as exemplified by the popularity of preference mapping (e.g., MacFie, 2007). However, Instead of focusing on "replication and extension" and being bound to this data-driven approach we could have sought stronger conceptual contributions regarding situational appropriateness, it's antecedents and consequences. For example, we could have placed greater focus on social conformity as an expected antecedent and segmented consumers based on this construct, and then examined if people with high social conformity had lower appropriateness ratings for F&B items regarded as atypical for a given eating occasion. This would address the limitations we currently face in regard to explaining why consumers belong to different clusters. The current data also allow for an exploration of within-person variability in consumers' segment membership, which could be *Conforming* in one eating occasion and *Adaptive* in another. Further analyses to characterise extent to which this happens and why should be performed. We expect that within-person variability in consumers' segment membership exists since some studies have shown that consumers' motives can change depending on situational aspects, and norms and cultural rules may be more salient in some situations and idiosyncratic preferences dominate in others (e.g., Mischel, 1977; Dubow, 1992; Chang & Tseng, 2015).

6. Implications and conclusions

The present research has partially replicated the work by Jaeger et al. (2019) with regard to consumer segmentation based on appropriateness ratings. Through the chosen "replication and extension" research strategy, the findings of Jaeger et al. (2019) were also extended to a different culture and eating occasions. Despite these advances, questions remain unanswered with regard to how widespread consumer segmentation based on appropriateness ratings is, how similar *Adaptive* and *Conforming* consumers are in other aspects of their food-related behaviours and beliefs, and what the underpinning factors that drive this segmentation. The present research also replicated the relationship between perceived appropriateness and F&B liking/disliking, whereby liked products can be both appropriate and inappropriate, depending on the eating occasions. The studied consumer characteristics were not able to explain consumers' membership of the *Adaptive* or *Conforming* appropriateness segments and other traits than those considered here must be included in future research to advance its theoretical contribution.

In regard to the relevance of the present research and its findings, we contributed knowledge regarding individual differences in appropriateness which is an under investigated topic. Greater understanding of *Adaptive* and *Conforming* response patterns (Obj. 1) give insights into consideration sets, i.e., which products are viewed as alternatives to one another. This could potentially be used to estimate market size and potential barriers to product adoption. For example, it may be easier to

launch a product into a new country/market where *Adaptive* consumers are the majority relative to one where *Conforming* tendencies are prevalent. This argument may also hold from a health perspective to suggests that knowledge of sizes of *Adaptive* and *Conforming* segments can give insight regarding the probability of incorporating novel products (e.g., plant based) into their dietary habits. In relation to Objective 2 (understanding relationships between appropriateness and liking) the results have clear implications for product testing, and show that liking and appropriateness provide different information (especially for liked food items). From a practical point of view, profiles of *Adaptive* and *Conforming* consumer segments (Obj. 3) could be used similarly to what is done in preference mapping. There the common approach is to identify patterns of preferences for target products and then explore if these correspond to any market relevant consumer characteristics, with the view to identify if one segment is more likely than another to accept the target product.

CRediT authorship contribution statement

Sara R. Jaeger: Conceptualization, Methodology, Investigation, Visualization, Writing - original draft, Writing - review & editing. **Christina M. Roigard:** Investigation. **Grace Ryan:** Investigation. **David Jin:** Investigation. **Davide Giacalone:** Conceptualization, Formal analysis, Writing - review & editing.

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.

Appendix A. Supplementary data

Refer to the e-component of this paper for the following supplementary materials: 1) Summary of Study 1 (Denmark) participant characteristics; 2) F&B names for Study 1 (Denmark) with details of their inclusion in the three eating occasions (breakfast, lunch and dinner); 3) Information about consumer trait scales used in Study 1 and Study 2. Danish translations included as appropriate; and 4) Summary of Study 2 (New Zealand) participant characteristics. Supplementary data to this article can be found online at https://doi.org/10.1016/j.foodqual.2020.104057.

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