

1 **HOW IMPORTANT ARE THE INFLUENCING FACTORS TO THE DECISION ON**
2 **WHETHER TO PROVIDE SEAFOOD IN INFANT AND YOUNG CHILD FEEDING?**

3

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14

15 **Abstract**

16

17 Seafood is recommended as part of a healthy, balanced introductory diet however, consumption
18 rates are low in young children. Research has previously investigated the influences to seafood
19 consumption in consumers and non-consumers however the importance of these factors in
20 mothers' decisions on whether to provide seafood for their child during the early years is
21 unknown. This study aimed to measure the importance of factors that influence mothers'
22 decisions on providing seafood for their child during infant and young child feeding (six
23 months to four years). A mixed method Q methodology and cognitive interview approach was
24 used with 32 mothers in Scotland. Despite a large consensus of opinion between mothers
25 (n=20) on the importance of factors on their decision-making, two viewpoints emerged
26 highlighting an importance placed on food attributes and the infant, and convenience and
27 family-centred. This study is the first to quantify the influences on the decision to provide
28 seafood during early years' feeding and could be used to inform and tailor seafood-based
29 dietary promotions and interventions for parents.

30

31 **Keywords:** seafood, infant feeding, weaning, complementary feeding, influences

32

33 **Highlights**

34

- 35 • Two viewpoints emerged; the first showing that mothers place an importance on the
36 food attributes and the impact on the infant, and the second on convenience and
37 family impacts as important in the decision to provide seafood during infant and
38 young child feeding
- 39 • A consensus of views was found with mothers placing an importance on the health
40 benefits and quality of seafood as important in the decision on whether to provide
41 seafood
- 42 • No differences in demographic characteristics of mothers was evident between the
43 viewpoints

44

45 **Introduction**

46 Providing a nutritiously balanced and varied diet during the early years is recommended in
47 global infant feeding guidelines (World Health Organization, 2005). Within this healthful diet
48 seafood (edible fish, shellfish, and crustaceans from wild and farmed sources) plays a role,
49 together with meat and alternatives, in providing energy, protein and iron, amongst other
50 nutrients which are required to meet the growing needs of the infant. The most recent UK Diet
51 and Nutrition Survey in Infant and Young Children (DNSIYC) indicates that 34% of seven to
52 nine month old children consumed fish over the recorded period compared to 40% having
53 consumed meat (red e.g. beef and white e.g. poultry) and 12% consuming meat products
54 (Department of Health, 2011), trends which mirror those of older children and adults (Public
55 Health England and Food Standards Agency, 2014). Evidence indicates that taste preferences
56 can be developed during the early years (Birch, 1999; Harris, 2008; Kajiura, Cowart, &
57 Beauchamp, 1992) and there is a suggestion that healthy eating patterns are established during
58 this period (Schwartz, Scholtens, Lalanne, Weenen, & Nicklaus, 2011). The dietary trends
59 evident in UK children are thus of great concern. Failure of the population to meet dietary
60 recommendations to limit red and processed meat consumption (Scientific Advisory
61 Committee on Nutrition, 2010), maintain current levels of white fish consumption and increase
62 consumption of oil-rich fish to one portion per week (Scientific Advisory Committee on
63 Nutrition, 2004) may continue in our youngest population and subsequently into their later life.

64

65 The consumption of seafood has been suggested to be driven more by perceived healthfulness
66 and a moral obligation to provide this food than taste and food preferences (Olsen, 2004).
67 However, a perception that seafood is expensive often acts as a barrier to consumption and to
68 frequent consumption (Bloomingdale et al., 2010; Neale, Nolan-Clark, Probst, Batterhan, &
69 Tapsell, 2012; Olsen, 2004; Verbeke & Vackier, 2005). Furthermore, a lack of confidence and
70 knowledge in preparing and cooking seafood (Leek, Maddock, & Foxall, 2000; Olsen, 2004;
71 Verbeke & Vackier, 2005), and the presence of bones and other physical attributes of seafood
72 (Neale et al., 2012; Verbeke & Vackier, 2005) are often perceived as barriers to consumption.
73 Previous research has also revealed that availability and confidence to cook seafood in addition
74 to the preferences of the partner and children, influences provision of seafood to the family
75 (McManus, Burns, Howat, Cooper, & Fielder, 2007). During infant and young child feeding
76 (IYCF) parents commonly receive advice and information on feeding practices (Alder, et al,
77 2004; Bryant, 1982; Carruth & Skinner, 2001; Hoddinott, Craig, Britten, & McInnes, 2010;
78 Horodynski, et al, 2007; Pridham, 1990). There is a lack of published work investigating the

79 advice parents are provided on the inclusion of seafood for infant feeding, however a study
80 with pregnant women has shown that messages on consuming seafood are often confusing and
81 contradictory (Bloomingdale et al., 2010).

82

83 A large bank of literature has previously investigated the influences on seafood consumption
84 in adult populations (Birch & Lawley, 2012; Birch, Lawley, & Hamblin, 2012; Birch &
85 Lawley, 2014; Bloomingdale et al., 2010; Foxall, Leek, & Maddock, 1998; Leek et al., 2000;
86 McManus et al., 2007; Myrland, Trondsen, Johnston, & Lund, 2000; Neale et al., 2012; Olsen,
87 2001; Olsen, 2003; Olsen, 2004; Pieniak, Verbeke, & Scholderer, 2010; Pieniak, Verbeke,
88 Scholderer, Brunsø, & Olsen, 2007; Trondsen, Braaten, Lund, & Eggen, 2004a; Trondsen,
89 Braaten, Lund, & Eggen, 2004b; Trondsen, Scholderer, Lund, & Eggen, 2003; Vardeman &
90 Aldoory, 2008; Verbeke, Sioen, Pieniak, Van Camp, & De Henauw, 2005; Verbeke & Vackier,
91 2005; Verbeke, et al, 2008). An investigation of the influences on mothers' decision to provide
92 seafood to their pre-school age child has additionally been conducted (McManus et al., 2007).
93 However, this study was conducted only in one urban area of Australia using focus group
94 discussions to explore influences to seafood consumption but did not explore the importance
95 mothers give to these differing factors, particularly during the introduction of solid foods (from
96 6 months of age) and the early years when taste preferences and food acceptance occurs. The
97 findings of this study are, to our knowledge, the first to measure the influences on mothers in
98 providing seafood during early years' feeding and could be used to inform and tailor seafood-
99 based dietary promotions and interventions.

100

101

102 **Methods**

103 This study employed a mixed method of Q methodology with an accompanying cognitive
104 'think aloud' interview to quantify and put into context the influencing factors viewed by
105 mothers' in the decision on whether to provide seafood into the diet of their young child. This
106 methodology incorporates a Q sort technique which involves rank-ordering of a set of
107 statements, providing participants with a decision-making task whilst allowing the researcher
108 to observe and examine the decision-making process (Brown, 1980b). This mixed method
109 incorporates a practical decision-making task providing a means to explore how each different
110 influencing factor compares within context to others, an aspect lacking from the use of single
111 aspect scales and questionnaires, such as Likert Scales.

112

113 ***Participants/Sample***

114 Mothers were recruited from pre-existing mother and baby/toddler groups identified from
115 internet searches, and from work-place intranet advertisements and further snowballing in the
116 North East of Scotland. Thirty two participant interview sessions were conducted with a sample
117 of mothers with a range of demographics including; - deprivation (measured using the Scottish
118 Index of Multiple Deprivation (SIMD) postcode look-up (Scottish Government, 2012c)),
119 urban/rural classification (measured by The Scottish Urban/Rural Classification (Scottish
120 Government, 2012a)), fishing/non-fishing communities (indicated from coastal locations and
121 Scottish Sea Fisheries Statistics (Scottish Government, 2015)), and child age.

122

123 It was deemed ethically correct to recruit only mothers who were over the age of 16 years due
124 to classification of any person under this age as a child. Primi- and multiparous mothers of
125 children aged six months (or younger if weaning had already started) and up to and including
126 four years of age were included to incorporate the weaning and early years' period. This age
127 range incorporates the key period when solid foods are introduced to infants, taste preferences
128 and acceptance and neophobia of different foods occurs. Multiparous mothers were asked to
129 think and refer to the feeding of their youngest child during the interview and sorting task. This
130 study recruited mothers only due to the suggestion of significant differences between genders
131 for views on food and health (Beardsworth, Bryman, Keil, Goode, Haslam, & Lancashire,
132 2002). Furthermore, evidence indicates that despite shared roles in meal planning and
133 preparation, women are more likely to take the primary responsibility for these tasks and are
134 also less likely than fathers to have no responsibility at all (Flagg, Sen, Kilgore, & Locher,
135 2014).

136

137 **Q set Development**

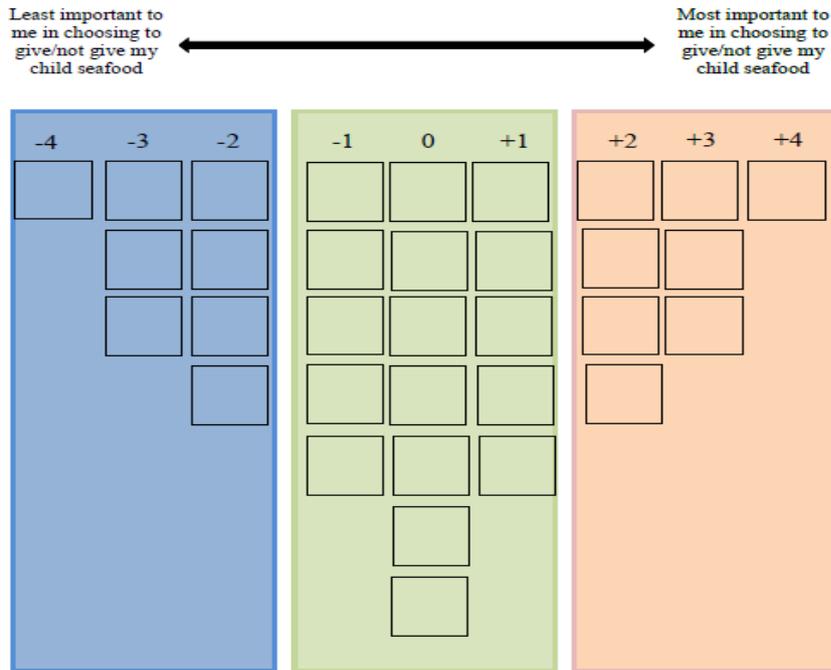
138 The statements for the sorting task were taken from themes identified through thematic analysis
139 of parenting internet discussion forums (popular parenting websites identified as being used
140 from previous studies (Hoddinott et al., 2010; Skea, Entwistle, Watt, & Russell, 2008)) and
141 focus group discussions carried out with mothers (n=29) of young children across six different
142 parent and infant/toddler groups in the North East of Scotland (themes published in Carstairs,
143 Marais, Craig, & Kiezebrink, 2017). Statements were developed from each of the themes
144 identified and piloted to ensure clarity and saturation of themes. Development of the Q set is
145 an extremely important step in Q Methodology and can be achieved through a thorough review

146 of the literature to identify themes however, information gathered during pilot studies,
147 interviews and focus group discussions is often used (Watts & Stenner, 2005). Thirty five
148 statements were originally piloted, the final Q set comprised 33 statements (Table 2) which
149 were assigned a code number and typed onto separate cards.
150

151 **Data Collection**

152 The Q sort and interview session (approximately 60 minutes) took place at the home of each
153 participant and was conducted by one researcher (SC) between May and September 2015. A
154 brief demographic questionnaire and informed consent form was obtained for each
155 participating mother prior to the interview session. Instructions on how to complete the task
156 were given by the researcher. Mothers were asked to sort the cards into three categories; - least
157 important to me when choosing to give/not give my child seafood, neutral, and most important
158 to me when choosing to give/not give my child seafood. Mothers were then asked to rank each
159 statement card using a fixed quasi-normal distribution response grid on a scale of -4 (least
160 important) to +4 (most important) (Figure 1). Throughout the sorting and ranking tasks mothers
161 were asked to ‘think aloud’ to verbalise their decision-making and provide context for the
162 placement of each statement card. Each interview session was audio recorded with the consent
163 of the mother. On completion of the sorting task the researcher recorded the positioning of each
164 statement on a template response grid. The study received ethical approval from the University
165 of Aberdeen College Ethics Review Board (Project no: CERB/2014/9/1094).

166



167
 168 **Figure 1:** The response grid.
 169 The three coloured areas were used to get participants to group the statements in the first
 170 instance into three; “what is important to me”; “what is not important to me”; “not
 171 sure/neutral”. Following this, participants placed the statements into the response grid squares.
 172

173
 174 **Data Analysis**

175 Demographic data for the participant sample were analysed using descriptive statistics. The
 176 order in which each participant ranked each statement in the Q set was entered into the
 177 PQMethod software 2.35 (Schmolck, 2014) for analysis. This analysis includes a by-person
 178 factor analysis technique to distinguish a correlation between participants’ Q sort rankings
 179 (Watts & Stenner, 2005) thus identifying commonality in emergent factors (viewpoints).
 180 Viewpoints are then subjected to varimax rotation which maximises the amount of variance
 181 explained by the factors. To identify the number of viewpoints to undergo rotation two checks
 182 were employed - resultant viewpoints must have an eigenvalue (EV) (a measure of
 183 communality) greater than 1.00 to be interpretable (Watts & Stenner, 2005). Secondly, the
 184 viewpoint must have a minimum of two Q sorts that load significantly upon it (for this analysis
 185 a significant loading at $P < 0.01$ was calculated as 0.449 (details of calculation in (Brown,
 186 1980a)). Q sorts that significantly load on a given viewpoint therefore share a similar sorting
 187 pattern and thus it can be assumed, share a distinct opinion of the influences to seafood

188 provision. Distinguishing statements (those significantly different at $P < 0.01$) will be used to
189 determine key statements which differ between viewpoints.

190 The audio recordings for a selection of participants were transcribed verbatim for qualitative
191 analysis. The participants' data selected for transcription was determined by the participants
192 who significantly loaded onto a single viewpoint. Particular focus was placed on the transcripts
193 from the participants who best represented the ideal for each viewpoint i.e. had loadings closest
194 to 1.0. Quotes were selected from discussions on specific statements to illustrate the points
195 made by mothers. The immersion in the qualitative text was conducted by the researcher (SC)
196 to examine the context and reasons behind participants' choices.

197

198 Fischer's exact test was conducted using SPSS software (IBM Corp, 2015) to investigate
199 possible associations between viewpoints and socio-demographic variables. A P-value of < 0.05
200 was considered statistically significant.

201

202

203 **Results**

204 *Participant Demographics*

205 Of the 32 mothers who participated in this study, the mean age of the mothers was 33.7 years
206 (SD = 4.39, range = 26 to 44 years) at the time of interview (Table 1). The mean age of the
207 child was 18.6 months (SD = 11.43, range = 5 to 42 months) and the mean number of children
208 in the household was 1.6 (SD = 0.75, range = 1 to 3). The sample had equal numbers of mothers
209 residing in the least deprived and most deprived areas. Mothers were predominantly seafood
210 eaters (91%; $n=29$) and also had given seafood to their youngest child (91%; $n=29$).

211 **Table 1:** Descriptive statistics of parent and child characteristics

Characteristic	Mean	Standard Deviation
Mother's age (years) (n=32)	33.7	4.39
Child's age (months) (n=33 ^a)	18.6	11.43
Children in household	1.6	0.75
	N	%
Child's gender ^a		
Male	19	58
Female	14	42
Married/Co-habiting	29	91
Working (part or full-time)	17	53
Area of Residence		
Most deprived (SIMD quintiles 1-3)	16	50
Least deprived (SIMD quintiles 4-5)	16	50
Urban	18	56
Rural	14	44
Fishing/coastal	14	44
Non-fishing/coastal	18	56
Consume seafood		
Mother	29	91
Child	29	91

212 ^aOne pair of twins in study

213

214

215 ***Q Methodology Factor Analysis***

216 The results of the Q methodology factor analysis identified two significant factors (viewpoints)
 217 (eigenvalues greater than 1.0 and two mothers' Q sorts significantly loaded onto viewpoint).

218 Factor 1 explained 25% of the study variance with eleven participants significantly associated
 219 with this viewpoint. Factor 2 explained 19% of the study variance and nine participants were

220 significantly associated with this viewpoint. Six participants significantly loaded on both
221 factors and a further six did not significantly load on either factor thus were excluded from
222 further analysis. A high correlation score (0.563 which is greater than the 0.449 significance
223 calculated for this analysis) was evident between the two viewpoints and with six participant's
224 significantly loading on both factors it was evident that the two viewpoints were alternative
225 manifestations of the same view (Watts & Stenner, 2012). This is further evidenced by the
226 number of consensus statements between the two viewpoints (described later in Table 2).

227

228 Factor arrays are presented in Table 2 showing the ranking of each statement in 'ideal'
229 viewpoints. In the following sections descriptions of each viewpoint use the ranking position
230 of distinguishing statements (statements which are significantly different ($P < 0.01$) between the
231 viewpoints calculated using z-scores) i.e. +3.

232 **Table 2:** Factor arrays for viewpoints identify significantly distinguishing statements
 233 between viewpoints and consensus statements.

Statement	Viewpoint 1	Viewpoint 2
	Rank	
I believe my child doesn't like it	-1	-2
Consensus Statement*		
It's healthy good for them	4	4
The quality of it	3	3
I want them to try it	3	3
I know how to cook it	2	2
The taste	2	2
I cook it within a day or two of buying it	1	1
I know what to but for my kid(s)	1	0
It's what I like	0	1
It's habit, I normally give them it	0	0
The time of the day	0	-1
Eating out of special occasion	-1	-1
I bulk cook it and reheat it later	-2	-1
The day of the week	-3	-2
It's traditional	-2	-3
Media tells me to give them it	-3	-2
Distinguishing statements †		
Viewpoint 1		
It's safe to give them it	3	1
The cost	2	-3
It's filling	2	-2
It's available	1	0
The texture	1	0
Health professionals tell me to give them it	0	-1
I had it as a child	0	-1
Viewpoint 2		
I want to have just one family meal	-1	3
It is quick to make	0	2
It takes little effort/easy to make	1	2
It's what my partner likes	-3	1
It's what my other children like	-4	0
The environment	0	1
The smell	-1	0
The look of it	-1	0
My family tell me to give them it	-2	-3
My friends give their kid(s) it	-2	-4

234 * denotes statements with no significant difference between factors at $P > 0.05$ † denotes a
 235 significant difference between factors at $P < 0.01$
 236

237 **Shared viewpoints**

238

239 Although it has been shown that the two viewpoints have key distinctions from each other,
240 there was a consensus with mothers from both viewpoints for some statements (Table 3). The
241 importance of taste (+2) was important in their decision on whether to give seafood to their
242 child however, this was not the most important aspect for mothers in this study.

243

244 **Health**

245 The majority of mothers placed a high importance on the health aspects of giving seafood to
246 their young child (+4) often relating it to the nutrients that seafood provides:

247 *“it's healthy or good for them’ would probably be at the top for the white fish and the prawns.*
248 *I think of it as a source of protein really and I know that there are some omega 3 fatty acids in*
249 *it that they don't necessarily get from anything else but to be honest I'm not sure that the fish*
250 *that I give them has actually got very much of that in it because it is usually just white fish and*
251 *prawns. I think it is more the fact that it is a source of protein really, that I think of” [P06, age*
252 *33, urban, fishing, 30 months]*

253

254 For the majority of mothers, the importance of health outweighed other practicalities of
255 providing seafood to their child:

256 *“It's a battle between that you know, you want them to have a balanced diet, it's got to be good*
257 *for them, but then it's easy and effortless to make. So it's a balance of being, knowing what you*
258 *should be giving them versus in real life how you fit it in and get things done. So I think for me*
259 *it's got... healthy has got to be the first one because it's good for them and I want them to have*
260 *a bit of everything, so making sure they have some seafood at least a couple of times a week is*
261 *very important”.* [P09, age 36, rural, fishing, 16 months]

262

263 In addition, mothers shared the consensus that they wanted their child to try seafood (+3),
264 highlighting a desire to avoid fussiness:

265 *“Just so they're not restricted as they get older and so that when they go out with friends or*
266 *they go to school or whatever, they're not, “Oh, I don't eat that and I don't eat this” and it*
267 *doesn't become a big problem. I'd like them to have just tried everything or as much as they*
268 *can”.* [P15, age 34, rural, non-fishing, 7 months]

269

270

271 **Quality**

272 The quality of seafood was an important aspect (+3) for the mothers and this was often
273 considered in respect to the transparency of what they are eating:

274 *“I don’t really want to be giving her stuff that I don’t know what’s in it, so yeah. [talking about*
275 *fish fingers] you don’t know quite what’s going on there, a bit like a chicken nugget. Whereas*
276 *if you get a frozen fish that looks like a fish, then it is a fish and there’s not much else in there”.*

277 [P12, age 31, rural, non-fishing, 12 months]

278

279

280 **Media Advice**

281 The unimportance of the media (-3 and -2) as a source of information on the inclusion of
282 seafood during infant and young child feeding (Table 3) was apparent, with mothers often
283 indicating distrust of the media:

284 *“with media you never know where the source of information is coming from, you never know*
285 *if it's been [pause] even if they say it's research, you never know what the point of it is. Are*
286 *they trying to sell a product or have they got an ulterior motive, so I don’t tend to listen to the*
287 *media in terms of that”.* [P04, age 33, rural, non-fishing, 36 months]

288

289 **Knowledge and skills**

290 Mothers ranked the knowledge of how to cook seafood (+2) as important, with some indicating
291 a lack of confidence resulting in avoiding cooking seafood for safety concerns and others
292 limiting the type of seafood they provide to their child:

293 *“I'm thinking food poisoning if I don't know how to cook it and so I wouldn't try and give them*
294 *it just in case”* [P28, age 34, urban, non-fishing, 12 months]

295

296 *“I give him like fish fingers, like, fish bites and fish goujons we eat but it’s always frozen...just*
297 *cos I don't know how to cook it. I mean tuna steak looks so tasty but I just wouldn’t have a clue*
298 *about how to cook it. I get nervous, I'm intimidated by cooking it”.* [P24, age33, urban, non-
299 fishing, 36 months]

300

301 **Viewpoint 1: Food attributes & infant-centred**

302 Of the eleven participants sharing viewpoint one, the mothers median age was 33 years (IQR
303 31-35 years). The median age of the child was 17 months (IQR 9-24 months). Mothers

304 predominantly had only one child (82%) and 82% cohabited. This first viewpoint is depicted
305 by food attributes and their impact on the young child and also an unimportance of other
306 members of the household compared with viewpoint 2. Food attributes including the texture of
307 seafood (+1) and also the availability of seafood (+1) were significantly distinguishing (Table
308 2) aspects impacting on the provision of seafood:

309 *"It's less chewy. She can break it down better with six teeth. So yeah, I'd say it was easier for*
310 *her to eat and gum to death than trying to chew on a bit of actual red meat or chicken."* [P12,
311 age 31, rural, non-fishing, 12 months]

312

313 *"Like, well, it's not the supermarket, he's not getting it! So yes, I guess that that is important.*
314 *It has to be available in my supermarket."* [P13, age 26, rural, non-fishing, 24 months]

315

316 **Safety**

317 Mothers who shared this viewpoint placed greatest significance on the importance of the safety
318 of seafood in giving this food to their young child (+3). The issues raised by the mothers often
319 included the risk of food poisoning and choking due to bones but also due to the mercury and
320 contaminant levels derived in seafood:

321 *"I suppose it is a wee bit important to me at the moment yeah, I'm more...it's the choking*
322 *hazard...I don't know what fish has bones in it and what doesn't"* [P27, age 34, urban, fishing,
323 5 months]

324

325 *"That's funny, because before I would definitely give it to them without a doubt, but since I*
326 *found out about the restrictions that really worried me. But the worrying one is to do with the*
327 *girl's fertility that would be the one [pause] I wouldn't want to affect their fertility by giving*
328 *them a lot of fish."* [P16, age 25, rural, non-fishing, 22 months]

329

330 **Value for money**

331 An additional attribute of seafood that mothers with this viewpoint shared was the cost of
332 providing seafood (+2):

333 *"Well, because we will give him fish fingers because that's one of the easier options if you have*
334 *less time, those are cheap so we keep those in the freezer, but that's not something (partner)*
335 *and I would have, so in that respect yes, but when we're trying to give him some of the similar*
336 *stuff to what we have, like salmon fillets and whatever, yes, he probably doesn't get it as much*

337 *because we don't eat it a much because it is expensive. I think actually fish is a bit more*
338 *expensive than the other meats*" [P13, age 26, rural, non-fishing, 24 months]

339

340 A need for the meal to be filling (+2) was also considered and combined with cost these aspects
341 were interrelated for some mothers where the value for money was considered:

342 *"I do think about it. And I maybe should spend more on food and that is one thing that slightly*
343 *puts me off fish as well because it is more expensive, or it seems to be more expensive anyway.*

344 *Whether it's just, if you spend £4 on chicken you get maybe one and a half or two meals out of*
345 *it whereas if you spend £4 on salmon you'd eat them in one meal and it would be a light meal*
346 *and you're hungry again later on in the evening. So for the same price you seem to get less*
347 *food for it with regards to fish*" [P02, age 30, rural, non-fishing, 18 months]

348

349 **Family Preferences**

350 However, it was the unimportance of family members' preferences, such as older siblings (-4)
351 that also exemplified this viewpoint, more so than the partner's preference (-3). Many mothers
352 discussed the fact that they often provided separate meals for weaning their youngest child:

353 *"I think I probably did her [infant] on quite an individual basis when I was weaning her so I*
354 *don't, I suppose I didn't really take account of what [other child's name] was liking or not*
355 *liking if it meant making a separate meal then that's kind of what I did*" [P04, age 33, rural,
356 non-fishing, 36 months]

357

358 **Health Professionals Advice**

359 Despite ranking the advice from health professionals as neutral, mothers of this first viewpoint
360 felt advice from this source was more important to their decision-making than those sharing
361 viewpoint 2, comparing this advice to that from other sources:

362 *"Yes, I'm more influenced by health professionals than the media, definitely so he's got a 27-*
363 *month check at the end of the month so if they've got an opinion on me giving him seafood,*
364 *then it's something I would take on board*" [P13, age 26, rural, non-fishing, 24 months]

365

366 Some mothers even referred to the written material provided by their health visitor, citing
367 information:

368 *"I look at my books and things from them [reading from her booklet] yeah I mean like here it*
369 *says "are there any foods I shouldn't give?" and it's like "foods before they're one" and they've*

370 *got shark, marling, swordfish, who gives their babies that anyway?"* [P27, age 34, urban,
371 fishing, 5 months]

372

373 **Viewpoint 2: Convenience & family-centred**

374 Nine mothers shared this second, alternative viewpoint. The median age of the mothers was 33
375 years (IQR 31-39 years) whilst the youngest child was aged 16 months (IQR 8.5-24 months).
376 More than half the mothers of this viewpoint (55%) had more than one child and all co-habited
377 (100%).

378

379 ***Shared family meal***

380 Of importance to mothers of this viewpoint, was having one family meal (+3) (Table 2) with
381 some highlighting an importance to cook only one meal:

382 *"If you don't like it then it's a bit tough in this house, if you don't like it you just move on and*
383 *miss that bit, I'm not making anything else and they just get pudding or whatever."* [P09, age
384 36, rural, fishing, 16 months]

385

386 and others referring to a learning experience and the social aspect of eating together:

387 *"I think a lot of it was kind of, not wanting to encourage fussiness, in my mind I think of serving*
388 *one meal as teaching children sometimes that they just have to be grateful for what they get. I*
389 *quite like the idea that it maybe makes it more of a family occasion if you're all eating the same*
390 *food rather than all doing separate things. There's just something about that. I think it is more*
391 *important to me because we don't spend the day together, you know that when we do it is*
392 *something that we all do."* [P06, age 33, urban, fishing, 30 months]

393

394 ***Family Preferences***

395 Although the mother's own preference (+1) was not a significantly distinguishing aspect,
396 mothers of this viewpoint ranked their husband/partner's preferences towards seafood (+1) as
397 fairly important, often resulting in the infrequent consumption and offering of seafood to their
398 child:

399 *"fish is something we eat very rarely in this house because my husband and I don't, it's not that*
400 *we don't like it, it's just not our favourite and we don't eat it that much so if we ate it a lot the*
401 *kids would eat it more."* [P05, 34, urban, fishing, 36 months]

402

403 But for others, some importance was placed on providing foods which conformed to their own
404 intakes:

405 *“So yes, that’s, I guess, a reason that we do give it to him because then his diet’s in line with*
406 *ours.”* [P10, aged 32, urban, fishing, 9 months]

407

408 ***Convenience***

409 The importance of the ease (+2) and quickness (+2) of providing seafood was apparent in these
410 mothers who chose to give both fresh and frozen seafood options:

411 *“Yes, that’s important when, I have the two of them. Yes, so I don’t really spend that much time*
412 *in the kitchen. I just put it in the steamer, two minutes and it’s ready, it’s just steaming there*
413 *and I can do something in the meantime, it’s ready in half an hour and we can all have it so*
414 *it’s really quick compared to the meats which you have to either fry or grill or something and*
415 *it does take more time so I think fish is actually quite quick to make”* [P11, age 30, urban,
416 fishing, 12 months]

417

418 ***Environment***

419 These mothers additionally placed some importance on the environmental aspects of eating
420 seafood (+1) on their decision-making compared to mothers with the first viewpoint:

421 *“Yes, so I do try and buy fish that’s been sustainably farmed and I do look at those things on*
422 *the packets. I do look at the fish and we try and buy dolphin-friendly tuna and things like that,*
423 *so yes, that kind of thing does influence me more than my husband.”* [P15, age 34, rural, non-
424 fishing, 7 months]

425

426 ***Sensory Attributes***

427 Despite low scores and neutral ranking for the importance of the smell (0) and look of seafood
428 (0), these physical, sensory characteristics were significantly more important for mothers of
429 this viewpoint compared to viewpoint one. However, mothers differed in whether these
430 attributes were important to themselves or to their child:

431 *“the look of it is probably neutral really because I know that my children have looked at it and*
432 *thought that it looked like other meats that they like, like chicken, so I suppose it certainly*
433 *wouldn’t put me off but I’m not sure it positively encourages either.”* [P06, age 33, urban,
434 fishing, 30 months]

435 *“it’s off putting to me [smell] but he likes it so I put up with it”* [P31, age 26, urban, fishing, 8
436 months]

437 ***Others views and opinions***

438 This viewpoint additionally showed that mothers placed the views of other people, such as their
439 friends (-4) and family (-3) as the least important aspects in choosing to give their young child
440 seafood, which was lower than mothers sharing the first viewpoint:

441 *“I think that’s least important. I don’t care that much about really what they say.”* [P11, age
442 30, urban, fishing, 12 months]

443

444

445 **Demographic analysis**

446 Possibly due to the small sample of mothers who significantly loaded onto the viewpoints
447 identified in this study (n=20), there were no significant relationships between the mothers’
448 viewpoint and demographic characteristics (Table 3). The majority of mothers sharing the first
449 viewpoint (73%) resided in non-fishing, inland communities (p=0.175) and 60% resided in the
450 areas of greatest deprivation (measured as those living in SIMD quintiles 1 to 3) (p=1.000).
451 The prevalence of single-child mothers who shared the view food attributes and infant-centred
452 (82%) was also not significantly different to those sharing the view of convenience and family-
453 centred (p=0.160). There was no relationship between the mothers age (p=1.000) or the age of
454 their child (p=1.000) and their viewpoint. Mothers who shared the convenience and family-
455 centred equally came from the least and most deprived areas (p=1.000) with 56% residing in
456 urban locations (p=1.000) whilst 67% came from fishing or coastal communities (p=0.175).
457 There was no significant relationship between mothers viewpoint and whether they consume
458 seafood (p=1.000) or give it to their young child (p=1.000). Despite a lower percentage of
459 mothers (55%) and children (46%) of viewpoint one consuming or giving oil-rich seafood, this
460 relationship was not significant (p≥0.157).

461

462

463 **Table 3:** The relationship between demographic characteristics and viewpoint.

Characteristic		% of Viewpoint		P-Value ^c
		Viewpoint 1 (n=11)	Viewpoint 2 (n=9)	
Mother's Age	26-33yr	54.5	55.6	1.000
	34-44yr	45.5	44.4	
Child's Age	5-12mths	45.5	55.6	1.000
	13-42mths	54.5	44.4	
Child Sex	Female	36.4	37.5	1.000
	Male	63.6	62.5	
Other children in household	Yes	18.2	55.6	0.160
	No	81.8	44.4	
Co-habiting	Yes	81.8	100.0	0.479
	No	18.2	0.0	
Working	Yes	63.6	44.4	0.653
	No	36.4	55.6	
Area of residence	Highest Deprivation ^a	60.0	50.0	1.000
	Lowest Deprivation ^b	40.0	50.0	
	Urban	54.5	55.6	1.000
	Rural	45.5	44.4	
	Fishing/Coastal	27.3	66.7	0.175
	Non-fishing	72.7	33.3	
Mother consumed ^d	Seafood	90.9	100.0	1.000
	Oil-rich seafood	54.5	88.9	
Child given ^d	Seafood	90.9	88.9	1.000
	Oil-rich seafood	45.5	77.8	

464 ^a defined as SIMD quintiles 1-3 ^b defined as SIMD quintiles 4-5 ^c Fischer's Exact Test ^d
 465 consumed seafood from weekly up to monthly basis

466

467

468 **Discussion**

469 This study aimed to investigate the importance of differing influencing factors on mothers'
 470 decisions to provide seafood into the diet of their child during early years' feeding using Q
 471 methodology. The sorting task and 'think aloud' interview revealed that there was an
 472 agreement between mothers on the importance and unimportance of many aspects in driving
 473 their decision on whether to include seafood during early years' feeding. However, two

474 viewpoints emerged in this group of mothers, namely; - food attributes and infant-centred, and
475 convenience and family-centred.

476

477 *Shared Views*

478 The importance of providing a healthy, balanced diet was paramount in mothers of both
479 viewpoints with a desire to try to provide a variety of different foods for their child that were
480 of good quality. The mothers in this study may have felt a moral obligation to provide good,
481 nutritious foods for their young child to give them a healthy start in life in agreement with
482 previous studies (Nielsen, Michaelsen, & Holm, 2014). By providing different foods to try,
483 mothers wished to socialise their child into family mealtimes and hoped to have social eating
484 outside the home without fuss or difficulty, an aspect also found in a study of Danish mothers
485 (Nielsen et al., 2014). This moral obligation evident in our study compliments previous
486 conclusions that seafood consumption is driven more by moral obligation than taste and
487 preferences compared with other foods (Olsen, 2004). However, it is important to consider that
488 mothers of this current study were predominantly seafood consumers who had offered seafood
489 to their child and thus have an acceptance of this food. They may have felt happy in disclosing
490 that they perceived seafood provision to be a moral obligation to be viewed as a “good parent”.
491 Non-seafood consuming parents however may not hold this aspect as important in their
492 decision-making compared to other factors, or wish to disclose feeling a moral obligation that
493 they may be seen to not achieve. Some of our mothers also believed that providing seafood for
494 their young child will encourage them to eat more healthily as a family, an aspect shared by
495 mothers of a previous UK-based study (Hoddinott et al., 2010), thus providing an opportunity
496 for seafood to appear more regularly on the household menu.

497

498 Mothers additionally shared the view that advice from media sources was the least important
499 influence to their decision on providing seafood. Many mothers felt a lack of trust towards
500 media as a source of information and mentioned ulterior motives by industry and food
501 manufacturers, mirroring previous accounts by mothers on healthy eating information (O’Key
502 & Hugh-Jones, 2010). The unimportance mothers placed on information and advice gained
503 was partly explained by a perception of mixed messages on when and what seafood you can
504 give your child that mothers received between different sources; findings which support those
505 of a previous study with pregnant women (Bloomingdale et al., 2010). Our sample of mothers
506 stated they relied on their own instincts when deciding to give seafood which may be a result
507 of mothers’ decision to ignore these confusing mixed messages. The confidence in their own

508 choices apparent in this group of mothers may be indicative of their familiarity with eating
509 seafood (Birch & Lawley, 2014) but may also be due to educational biases, a measure not
510 recorded in this study. However, we should consider that mothers who do not consume seafood
511 may not feel as confident with filtering the information and advice they receive on seafood and
512 place a greater importance of this factor in their decision-making. The unimportance of advice
513 from others on seafood provision held by these mothers opposes findings from infant feeding
514 studies where advice from the maternal grandmother and encouragement from friends on the
515 timing of weaning are sought (Alder, Williams, Anderson, Forsyth, du ve Florey, & van der
516 Velde, 2004). This insignificance of external information sources on seafood inclusion could
517 be suggested to be due to previous weaning experiences of older children (Hoddinott et al.,
518 2010) or possibly due to mothers choosing to ignore these perceived mixed messages.
519 Furthermore, the mother's education and socio-economic status may also play a role however,
520 no statistical relationship was found in this study between multiparous mothers, level of
521 deprivation and this second viewpoint, possibly due to the small sample size. The preferences
522 of the partner were deemed important for mothers sharing the convenience and family-centred
523 viewpoint indicating that the influence of the significant other may play a role more than advice
524 from other family members out-with the household (Hoddinott et al., 2010).

525

526 *Convenience and family-centred*

527 The idealism of providing a healthy diet for the child often competes with everyday
528 practicalities of feeding (Hoddinott, Craig, Britten, & McInnes, 2012) and mothers of the
529 second viewpoint held a great importance on providing one family meal. These mothers may
530 in part wish to prepare and cook just one meal which the infant can share to incorporate them
531 into the family (Hoddinott et al., 2010) and a shared eating experience however, family
532 preferences and time constraints may play an interrelated role. Interestingly mothers expressing
533 this view did not perceive the cost of seafood as central to their decision-making unlike their
534 counterparts who deemed this as important. Previous findings have shown that seafood is often
535 perceived as expensive and may act as a barrier to consumption (Bloomingdale et al., 2010;
536 McManus et al., 2007; Neale et al., 2012; Verbeke & Vackier, 2005) however, mothers sharing
537 the second viewpoint did not perceive cost as a barrier as many had found affordable seafood
538 options and others did not perceive this as any more expensive than other protein-rich types.
539 Furthermore, the majority of mothers were seafood-eaters and described providing a taste of
540 seafood for their child from their own plate, limiting individually prepared meals for the young
541 child. The greater importance of family food preferences evident in the convenience and

542 family-centred viewpoint compliments the importance and desire to have a family meal and
543 can often impact on the frequency of seafood meals appearing on the household menu
544 (McManus et al., 2007; Myrland et al., 2000; Verbeke & Vackier, 2005).

545

546 *Food attributes and infant-centred*

547 The importance of safety for mothers who shared the food-attributes and infant-centred
548 viewpoint shows a concern by these mothers of aspects such as texture, risk of choking, the
549 risk of food poisoning, allergic reactions, and toxicological contamination. Balancing the
550 benefits of seafood with these risks has been an area of debate (Nesheim & Yaktine, 2007).
551 The framing of seafood messages may play an important role in mothers' decision-making and
552 a prominence of the associated risks of harm may overshadow health benefits (Rothman &
553 Salovey, 1997). It was expected that mothers who shared the viewpoint of food attributes and
554 infant-centred would be primiparous, providing an individual meal for the weaning child
555 compared to convenience and family-centred mothers who may be impacted more by
556 competing priorities and preferences of older children (Robinson et al., 2007). A greater
557 percentage of mothers sharing the food attribute and infant-centred view had only one child
558 however, no statistical difference was found between mothers of each viewpoint, again
559 possibly due to the final sample size being too small to detect any differences rather than no
560 differences being found. It was expected that mothers of children within the weaning
561 developmental stage (6-12mths) would hold the viewpoint of food attributes and infant-centred
562 as this is the stage of introducing solid foods and when parents may be more hesitant and
563 conscious towards the safety of food and how their child responds to foods. However possibly
564 due to the small sample size, the trend towards mothers of this viewpoint having children within
565 this younger age group was not statistically significant. The buying and preparation of separate
566 foods for the weaning infant may provide an opportunity for non-seafood eating mothers to
567 provide a food which does not suit their own preferences and it was often mentioned by mothers
568 that they wished to offer foods that they themselves did not enjoy to widen the child's
569 acceptance of foods, possibly explaining the lesser importance of the mothers preference on
570 the decision on whether to include seafood in our sample.

571

572 *Limitations*

573 The provision of a practical decision-making tool and accompanying 'think aloud' interview
574 utilised in this study permitted the researcher to view the decision-making process by mothers
575 and listen to their reasoning. The presence of the researcher could however have influenced the

576 mother to rank and discuss key factors in a manner that they believed was to be expected to be
577 perceived as a ‘good mother’. Nonetheless, completing the Q sorting task in the presence of
578 the researcher was necessary to explain the process of the Q sort and record and probe mothers
579 during the ‘think aloud’ interview.

580

581 Our sample of 32 mothers was deemed sufficient to the design of Q methodology, which
582 requires only a limited number of respondents (Watts & Stenner, 2005), and took into
583 consideration a range of mothers from different areas of residence (urban/rural, fishing/non-
584 fishing), deprivation levels, and with a range of child’s ages. However, the twelve mothers
585 whose views were excluded from the analysis due to insignificant or confounded loading
586 reduced the sample size which may have influenced the lack of relationships found between
587 viewpoints and mothers demographic information. It is a generally held view that those with
588 an interest in the research topic are more likely to volunteer for participation and it was evident
589 that there was a bias to our sample, where mothers were primarily seafood consumers who had
590 given seafood to their child. Future research should be conducted in non-seafood consuming
591 parents to fully understand the decision to provide seafood during the early years. Despite
592 recruiting mothers from a selection of deprivation levels, it must be considered that SIMD
593 scores represent deprivation on an area level and not an individual basis (Scottish Government,
594 2012b). Thus the range of mothers from socio-economically divergent backgrounds may not
595 have been achieved and results may not be generalizable to other populations. A further
596 limitation of this study was the inclusion of one mother who had a child aged five months of
597 age. This age is below the recommended six months for the introduction of solid foods and
598 thus inclusion of seafood in the diet, on this occasion the mother had begun introducing solid
599 foods and discussed their intentions and plans on providing seafood in their child’s diet. Our
600 sample included a broad range of child age; from weaning to pre-school, however the sample
601 size in this study did not permit the investigation of differences in mothers’ opinions according
602 to the child’s developmental stage therefore, future studies are required to determine any key
603 differences in the importance mothers place on the influences to their decision-making.

604

605 It is important to consider that fathers who hold the primary food provider role in the household
606 may have a different opinion on the importance of the influences. This study was limited to
607 mothers due to possible gender differences in opinions however, future research should
608 consider the role and views of fathers in the decision to provide seafood and should additionally
609 consider the implications of shared custody of children and the impact on food choices. The

610 findings from this research study provides an insight into the importance mothers place on the
611 influences to their decisions on providing seafood during infant and young child feeding.
612 Furthermore, these findings can be used to inform and tailor interventions aimed at increasing
613 and promoting the provision of seafood by parents to meet recommendations based on their
614 views on whether food attributes and the infant are of focus or whether convenience and family-
615 centred focus is more important.

616

617 **Transparency Declaration**

618 The lead author (SC) affirms that this manuscript is an honest, accurate, and transparent
619 account of the study being reported; that no important aspects of the study have been omitted;
620 and that any discrepancies from the study as planned have been explained.

621

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639

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641 Substantial contributions to the conception or design of the work; data collection, analysis, and
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644 publication was done by SC with the revision for important intellectual content and final
645 approval of the version to be published given by KK, LC and DM. There is agreement between
646 the authors that SC is accountable for all aspects of the work in ensuring that questions related
647 to the accuracy or integrity of any part of the work are appropriately investigated and resolved.
648

649 **References**

- 650 Alder, E., Williams, F., Anderson, A., Forsyth, S., du ve Florey, C., & van der Velde, P.
651 (2004). What influences the timing of the introduction of solid food to infants? *British*
652 *Journal of Nutrition*, 92(3), 527-531.
- 653 Beardsworth, A., Bryman, A., Keil, T., Goode, J., Haslam, C., & Lancashire, E. (2002).
654 Women, men and food: The significance of gender for nutritional attitudes and choices.
655 *British Food Journal*, 104(7), 470-491.
- 656 Birch LL. (1999). Development of food preferences. *Annual Review of Nutrition*, 19, 41-62.
- 657 Birch, D., & Lawley, M. (2012). Buying seafood: Understanding barriers to purchase across
658 consumption segments. *Food Quality and Preference*, 26(1), 12-21.
- 659 Birch, D., & Lawley, M. (2014). The role of habit, childhood consumption, familiarity, and
660 attitudes across seafood consumption segments in australia. *Journal of Food Products*
661 *Marketing*, 20(1), 98-113.
- 662 Birch, D., Lawley, M., & Hamblin, D. (2012). Drivers and barriers to seafood consumption in
663 Australia. *Journal of Consumer Marketing*, 29(1), 64-73.
- 664 Bloomingdale, A., Guthrie, L. B., Price, S., Wright, R. O., Platek, D., Haines, J., & Oken, E.
665 (2010). A qualitative study of fish consumption during pregnancy. *The American*
666 *Journal of Clinical Nutrition*, 92(5), 1234-1240.
- 667 Brown, S. (1980a). Political subjectivity: Applications of Q methodology in political science.
668 (pp. 222-223). New Haven, CT: Yale University Press.
- 669 Brown, S. (1980b). *Political subjectivity: Applications of Q methodology in political science*.
670 New Haven, CT: Yale University Press.
- 671 Bryant, C. A. (1982). The impact of kin, friend and neighbor networks on infant feeding
672 practices: Cuban, Puerto Rican and Anglo families in florida. *Social Science &*
673 *Medicine*, 16(20), 1757-1765.
- 674 Carruth, B. R., & Skinner, J. D. (2001). Mothers' sources of information about feeding their
675 children ages 2 months to 54 months. *Journal of Nutrition Education*, 33(3), 143-147.
- 676 Carstairs, S., Marais, D., Craig, L., & Kiezebrink, K. (2017). Factors influencing mothers'
677 decisions on whether to provide seafood during early years' feeding: A qualitative study.
678 *Appetite*, 108(1), 277-287.
- 679 Department of Health. (2011). *Diet and nutrition survey of infants and young children 2011*.
680 London: Department of Health and The Food Standards Agency.

681 Flagg, L. A., Sen, B., Kilgore, M., & Locher, J. L. (2014). The influence of gender, age,
682 education and household size on meal preparation and food shopping responsibilities.
683 *Public Health Nutrition*, 17(09), 2061-2070.

684 Foxall, G., Leek, S., & Maddock, S. (1998). Cognitive antecedents of consumers' willingness
685 to purchase fish rich in polyunsaturated fatty acids (PUFA). *Appetite*, 31(3), 391-402.

686 Harris, G. (2008). Development of taste and food preferences in children. *Current Opinion in*
687 *Clinical Nutrition & Metabolic Care*, 11(3), 315-319.

688 Hoddinott, P., Craig, L., Britten, J., & McInnes, R. (2010). *A prospective study exploring the*
689 *early infant feeding experiences of parents and their significant others during the first 6*
690 *months of life: What would make a difference?* Edinburgh: NHS Health Scotland.

691 Hoddinott, P., Craig, L. C. A., Britten, J., & McInnes, R. M. (2012). A serial qualitative
692 interview study of infant feeding experiences: Idealism meets realism. *BMJ Open*, 2(2)

693 Horodyski, M., Olson, B., Arndt, M. J., Brophy-Herb, H., Shirer, K., & Shemanski, R.
694 (2007). Low-income mothers' decisions regarding when and why to introduce solid
695 foods to their infants: Influencing factors. *Journal of Community Health Nursing*, 24(2),
696 101-118.

697 IBM Corp. (2015). *Statistical package for the social sciences* (23.0rd ed.). NY: Armonk.

698 Kajiura, H., Cowart, B. J., & Beauchamp, G. K. (1992). Early developmental change in bitter
699 taste responses in human infants. *Developmental Psychobiology*, 25(5), 375-386.

700 Leek, S., Maddock, S., & Foxall, G. (2000). Situational determinants of fish consumption. *Br*
701 *Food J*, 102(1), 18-31.

702 McManus, A., Burns, S., Howat, P., Cooper, L., & Fielder, L. (2007). Factors influencing the
703 consumption of seafood among young children in Perth: A qualitative study. *BMC*
704 *Public Health*, 7(1), 119.

705 Myrland, Ø., Trondsen, T., Johnston, R. S., & Lund, E. (2000). Determinants of seafood
706 consumption in Norway: Lifestyle, revealed preferences, and barriers to consumption.
707 *Food Quality and Preference*, 11(3), 169-188.

708 Neale, E. P., Nolan-Clark, D., Probst, Y. C., Batterhan, M. J., & Tapsell, L. C. (2012).
709 Comparing attitudes to fish consumption between clinical trial participants and non-trial
710 individuals. *Nutrition & Dietetics*, 69(2), 124-129.

711 Nesheim, M. C., & Yaktine, A. L. (Eds.). (2007). *Seafood choices: Balancing benefits and*
712 *risks* (First ed.). Washington DC: The National Academies Press.

713 Nielsen, A., Michaelsen, K. F., & Holm, L. (2014). Beyond an assumed Mother–Child
714 symbiosis in nutritional guidelines: The everyday reasoning behind complementary
715 feeding decisions. *Child Care in Practice*, 20(3), 329-346.

716 O’Key, V., & Hugh-Jones, S. (2010). I don’t need anybody to tell me what I should be
717 doing’. A discursive analysis of maternal accounts of (mis)trust of healthy eating
718 information. *Appetite*, 54(3), 524-532.

719 Olsen, S. O. (2001). Consumer involvement in seafood as family meals in Norway: An
720 application of the expectancy-value approach. *Appetite*, 36, 173-186.

721 Olsen, S. O. (2003). Understanding the relationship between age and seafood consumption:
722 The mediating role of attitude, health involvement and convenience. *Food Quality and*
723 *Preference*, 14(3), 199-209.

724 Olsen, S. O. (2004). Antecedents of seafood consumption behavior. *Journal of Aquatic Food*
725 *Product Technology*, 13(3), 79-91.

726 Pieniak, Z., Verbeke, W., & Scholderer, J. (2010). Health-related beliefs and consumer
727 knowledge as determinants of fish consumption. *Journal of Human Nutrition and*
728 *Dietetics*, 23(5), 480-488.

729 Pieniak, Z., Verbeke, W., Scholderer, J., Brunso, K., & Olsen, S. O. (2007). European
730 consumers’ use of and trust in information sources about fish. *Food Quality and*
731 *Preference*, 18(8), 1050-1063.

732 Pridham, K. F. (1990). Feeding behavior of 6- to 12-month-old infants: Assessment and
733 sources of parental information. *The Journal of Pediatrics*, 117(2, Part 2), S174-S180.

734 Public Health England and Food Standards Agency. (2014). *National diet and nutrition*
735 *survey: Results from years 1,2,3 and 4 (combined) of the rolling programme (2008/2009*
736 *- 2011/2012)*. London: Public Health England.

737 Robinson, S., Marriott, L., Poole, J., Crozier, S., Borland, S., Lawrence, W., Inskip, H.
738 (2007). Dietary patterns in infancy: The importance of maternal and family influences on
739 feeding practice. *British Journal of Nutrition*, 98(05), 1029-1037.

740 Rothman, A., & Salovey, P. (1997). Shaping perceptions to motivate health behaviour: The
741 role of message framing. *Psychological Bulletin*, 121(1), 3-19.

742 Schmolck, P. (2014). *PQMethod* (2.35th ed.). Available from
743 <http://schmolck.userweb.mwn.de/qmethod/#PQMethod>: Schmolck, P.

744 Schwartz, C., Scholtens, P. A. M. J., Lalanne, A., Weenen, H., & Nicklaus, S. (2011).
745 Development of healthy eating habits early in life. review of recent evidence and
746 selected guidelines. *Appetite*, 57(3), 796-807.

747 Scientific Advisory Committee on Nutrition. (2004). *Advice on fish consumption: Benefits*
748 *and risks*. London: Food Standards Agency and Department of Health, TSO.

749 Scientific Advisory Committee on Nutrition. (2010). *Iron and health report*. London: TSO.

750 Scottish Government. (2012a). *Scottish Government Urban/Rural Classification 2011-2012*.
751 Edinburgh: Scottish Government.

752 Scottish Government. (2012b). *Scottish index of multiple deprivation 2012: General report*.
753 Edinburgh: Scottish Government.

754 Scottish Government. (2012c). *SIMD 2012 postcode lookup - excel*. Edinburgh: Scottish
755 Government.

756 Scottish Government. (2015). *Scottish sea fisheries statistics 2014*. (). Edinburgh: Scottish
757 Government.

758 Skea, Z. C., Entwistle, V. A., Watt, I., & Russell, E. (2008). 'Avoiding harm to others'
759 considerations in relation to parental measles, mumps and rubella (MMR) vaccination
760 discussions – an analysis of an online chat forum. *Social Science & Medicine*, 67(9),
761 1382-1390.

762 Trondsen, T., Braaten, T., Lund, E., & Eggen, A. (2004a). Consumption of seafood - the
763 influence of overweight and health beliefs. *Food Quality and Pref*, 15, 361-374.

764 Trondsen, T., Braaten, T., Lund, E., & Eggen, A. E. (2004b). Health and seafood
765 consumption patterns among women aged 45–69 years. A Norwegian seafood
766 consumption study. *Food Quality and Preference*, 15(2), 117-128.

767 Trondsen, T., Scholderer, J., Lund, E., & Eggen, A. E. (2003). Perceived barriers to
768 consumption of fish among Norwegian women. *Appetite*, 41(3), 301-314.

769 Vardeman, J. E., & Aldoory, L. (2008). A qualitative study of how women make meaning of
770 contradictory media messages about the risks of eating fish. *Health Communication*,
771 23(3), 282-291.

772 Verbeke, W., Sioen, I., Pieniak, Z., Van Camp, J., & De Henauw, S. (2005). Consumer
773 perception versus scientific evidence about health benefits and safety risks from fish
774 consumption. *Public Health Nutrition*, 8(4), 422-429.

775 Verbeke, W., & Vackier, I. (2005). Individual determinants of fish consumption: Application
776 of the theory of planned behaviour. *Appetite*, 44(1), 67-82.

777 Verbeke, W., Vanhonacker, F., Frewer, L. J., Sioen, I., De Henauw, S., & Van Camp, J.
778 (2008). Communicating risks and benefits from fish consumption: Impact on Belgian
779 consumers' perception and intention to eat fish. *Risk Analysis*, 28(4), 951-967.

- 780 Watts, S., & Stenner, P. (2005). Doing Q methodology: Theory, method and interpretation.
781 *Qualitative Research in Psychology*, 2(1), 67-91.
- 782 Watts, S., & Stenner, P. (2012). Doing Q methodological research. theory, method and
783 interpretation. (pp. 141-142). London: SAGE Publications.
- 784 World Health Organization. (2005). *Guiding principles for feeding non-breastfed children 6-*
785 *24 months of age*. Geneva: World Health Organization.
- 786