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Aim: The study aims to investigate attitudes and perceptions influencing fish consumption in a sample of clinical trial participants and compare these perceptions to those expressed by a sample of adults not involved in the trial. **Methods:** Six semi-structured focus groups were conducted; three with participants of a weight loss trial which incorporated specific and general fish consumption advice (n = 15) and three with nontrial participants from the same study population (n = 14). All data were recorded digitally and transcribed verbatim by the moderator. Data analysis was carried out using NVivo (QSR International Pty Ltd, Melbourne, Victoria, Australia). Factors influencing fish consumption were coded into a number of sub-themes and themes. **Results:** The main factors that influenced fish consumption were health impact, the cost of consuming fish and seafood products, the physical and sensory characteristics of fish, food preferences of family members, and the culinary positions of fish and seafood. **Conclusion:** This study highlighted attitudes and perceptions that may influence fish consumption. A clinical trial incorporating dietetic intervention appeared to influence the importance participants placed on nutrition education; however, additional practical strategies may be required to address barriers to consumption such as perceived price and availability.

Disciplines

Arts and Humanities | Life Sciences | Medicine and Health Sciences | Social and Behavioral Sciences

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Comparing attitudes to fish consumption between clinical trial participants and non-trial individuals

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Keywords: Dietetic education; fish consumption; focus group; qualitative research

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1. INTRODUCTION

Habitual fish consumption has been associated with a range of health benefits, including decreased incidence of stroke and heart failure and decreased mortality from cardiovascular disease.¹⁻⁵ Nevertheless, fish consumption in Australia remains below that recommended by authoritative health organisations.^{6,7} Research has identified several barriers to fish consumption, including cost, availability and children's food preferences.⁸⁻¹² Dietetic intervention may be a method of overcoming these barriers and thus increasing fish consumption. One way of testing this hypothesis would be to compare opinions of individuals who recently completed a clinical trial involving dietary intervention, where specific and general advice was given regarding fish consumption, with those expressed by participants who would not have participated in the trial. This analysis may provide insight into the potential impact of such dietetic education to influence perceptions of fish consumption, which may then assist in the development of behavioural strategies to increase fish consumption.

The aim of this study was to investigate perceptions and attitudes influencing fish consumption expressed by participants in a clinical trial that tested the effects of fish consumption on health, and to compare these perceptions with those expressed by a sample of similar healthy adults not involved in the trial.

2. METHODS

The study drew on participants in a 12-month parallel randomised controlled trial conducted with overweight adult volunteers from Wollongong, a major city 70 km south of Sydney, Australia. The trial involved 126 participants in three dietary advice arms, two of which emphasised fish consumption and all of which received supplementary capsules. The third group was instructed to consume a healthy diet which incorporated fish; however, no specific fish prescription was given. The trial was registered with the Australian Clinical Trials Registry (ACTRN12608000425392).

Semi-structured focus group interviews were conducted at the University of Wollongong. Participants from all three trial arms who had completed the trial at the time of recruitment ($n = 34$) were invited to join the study by means of email and follow-up phone calls. University staff members who had not been involved in the trial were recruited via an email sent to all general staff, and all interested participants ($n = 14$) were invited to attend the groups via a follow-up phone call or email. The exclusion criteria for this group were participation in the clinical trial or below 30 years of age. All interested participants were sent an information sheet and consent form which highlighted fish as a topic for discussion in the groups and were provided with a parking voucher for the University of Wollongong. Ethical approval for this study was granted by the University of Wollongong Human Research Ethics Committee, and signed consent was obtained from all participants.

All focus groups were conducted in November 2009 and each ran for approximately one hour. Trial participants and University staff members were assigned to different groups to ensure comparison of results. Prior to each session, participants were oriented on the purpose of the focus groups and were informed of the de-identification process. Participants were also informed that there were no right or wrong answers and that they were free to leave the group at any time. All participants provided information regarding age range, height, weight and highest level of education. Clinical trial allocation as it pertained to specific or general fish advice was also noted for the trial participants. Provided height and weight data were used to calculate body mass index (BMI) for all participants. Between-group differences in BMI were assessed using an independent *t*-test. Between-group differences in categorical variables were not conducted because of a violation of the minimum cell frequency assumption. All statistical analysis was performed using SPSS (version 17.0, SPSS Inc., Chicago, IL, USA).

Each focus group session was divided into two sections, one of which related to fish consumption (reported here), and each section was conducted by a separate moderator. The moderator who was not conducting the section acted as observer. The section relating to fish consumption consisted of six pre-developed primary questions (Figure 1). The questions were developed based on the process proposed by Krueger and Casey.¹³ These questions related to participants' opinions on meeting recommendations for fish consumption, based on the specific and general fish advice given in the trial for the trial participants and the advice from health organisations for non-trial participants. Non-trial participants were asked these questions in the context of their everyday lives, while trial participants were asked about their

experiences and attitudes to fish during and since completing the clinical trial. The questions also addressed factors that encouraged or discouraged fish and seafood consumption, and opinions on the consumption of fish supplements. Probing questions were used where appropriate to allow participants to clarify or expand on comments.

1. What are your experiences in incorporating fish and seafood into your regular diet? [Probe: What are your main reasons for including fish and seafood in your diet?]
2. What types of fish and seafood do you tend to include in your diet? [Probe: Why do you choose to include these types of fish and seafood?]
3. Are there any factors which you would consider to impair your ability to eat fish and seafood regularly? [Probe: price, family preferences, availability]
4. What might encourage you to eat more fish and seafood? [Probe: change in price, greater access]
5. Have you seen fish oil supplements? What do you think of them? [Probe: Would you consider these to be an alternative to fish? Why/why not?]
6. Have you seen omega-3 fortified foods? What do you think of them? [Probe: Would you consider these to be an alternative to fish? Why/why not?]

Figure 1. Moderator questions for investigating focus group participant opinions on fish and omega-3 supplements and fortified foods.

All focus groups were digitally recorded and then transcribed verbatim, with participant names coded to ensure confidentiality. Focus group transcripts were uploaded into a computer software package, NVivo 7.0 (QSR International Pty Ltd, Melbourne, Victoria, Australia), to allow for data analysis and coding. Data analysis was conducted using a simple discourse analysis technique which reported on the substantive nature of the discussion. Transcribed data were coded into a number of sub-themes of factors which influenced fish consumption. The moderator (E.N.) carried out the analysis of transcribed data to identify sub themes within the focus group discussion, and coding processes were discussed with other members of the research team (D.N-C. and L.T.) to ensure reliability. These sub-themes were then grouped into a number of larger themes, representing a broader conceptual framework. Final thematic analysis, categorisation and conclusions were reached by consensus with the co-moderator of the groups (D.N-C.) and another member of the research team (L.T.).

3. RESULTS AND DISCUSSION

Eighteen participants involved in the trial expressed an interest in the study and were scheduled into one of three groups. Three participants cancelled due to time constraints, leaving a total of 15 participants. Fourteen non-trial participants recruited through the university email system expressed an interest and all took part in one of three focus groups, resulting in a total of 29 participants in six focus groups. Trial participants had a significantly higher BMI ($P = 0.023$) (Table 1).

Table 1. Characteristics of focus group participants

	<i>SMART</i>	<i>University staff</i>
Total number of groups	3	3
Total number of participants	15	14
Gender frequency		
Females	12	11
Males	3	3
Age frequency:		
Below 50 years old	8	11
Above 50 years old	7	3
Mean BMI (kg/m ²)	29.0	24.9
Education level frequency:		
Year 10	2	2
Year 12	2	0
Technical and Further Education	6	4
University degree	5	8

BMI, body mass index.

The results reported in the present study were participant responses relating to fish consumption alone, rather than supplement or fortified food consumption. The main themes relating to factors that influenced fish consumption were health impact, the cost of consuming fish and seafood products (both in terms of time and money), the physical and sensory characteristics of fish, food preferences of family members, and the culinary position of fish and seafood. Saturation of themes was reached throughout the course of both the trial and non-trial groups.

3.1 The health impact of fish and seafood consumption

Overall, fish and seafood were primarily viewed as healthy products by both trial and non-trial participants, with a number of associated health benefits. Participants referred to fish as being a source of omega-3 polyunsaturated fatty acids, with oily fish referred to as the healthiest fish option. Health benefits associated with consuming fish discussed included improved brain health, prevention of Alzheimer's disease, neural development in children, joint functioning, management of arthritis, improving 'good cholesterol' levels, management of blood pressure and maintaining heart health. This finding was consistent with the literature,^{8,10,11,14} where it is also noted that females rate the health value of food as more important than males.¹⁵ Our focus groups contained mainly females, which may account for the prominence of health as a value attributed to fish consumption.

'It does now [after being in the trial], now I put fish in cos I know it's probably way better for you than all the red meats and everything so once or twice a week we always, always put it in as part of a meal (F, FG 2, trial participant).

I probably eat it solely for the health reason, and I know I should eat it so I will try and put it in my diet more, um if it wasn't a healthy option I probably wouldn't eat it that much' (F, FG 5, non-trial participant).

Nutrition education and exposure to information on the benefits of regularly consuming fish appeared to influence participants' decisions on consuming fish, particularly for trial participants. Conversely, non-trial participants rarely mentioned the influence of nutrition education sources, but they did refer to advice provided by health professionals such as doctors. This difference may reflect the use of nutrition education materials provided to trial participants where emphasis was placed on evidence-based recommendations for increased fish consumption and may represent a vehicle for increasing awareness during dietary education.

'So, so the research on it has been really helpful with education, um so yeah for me, personally it rates very highly' (F, FG 3, trial participant).

'And personal health recommendations from doctors and things and um, yeah [encourage fish consumption]' (F, FG 4, non-trial participant).

Some participants from both groups expressed concern regarding potential contaminants in fish, for example, mercury. In addition, while generally being perceived as a healthy product, several participants viewed fish and seafood as being a poor source of some essential nutrients. Several participants referred to fish as providing less iron than red meat, and thus being unable to meet their nutritional requirements. Furthermore, while fish itself was acknowledged as a healthy food, traditionally associated foods such as hot chips and common cooking methods were perceived as having a detrimental effect on the health value of the total meal.

3.2 Financial and time cost associated with fish and seafood consumption

Many participants from both the trial and non-trial groups referred to both the financial and time cost associated with fish consumption as influencing their ability and inclination to consume fish and seafood. Several participants from both groups viewed fish and seafood as being more expensive than other protein sources such as meat, and as a result of this, was seen by some participants as a 'treat'. Preparing fish and seafood was also viewed as being associated with a greater amount of wastage than other protein sources, further decreasing its perceived value for money. The perception of seafood being expensive is reported in other studies,⁸⁻¹⁰ but not in all, with one study from the UK reporting that consumers tended to view fish as being reasonably priced.¹⁶

'I wish they'd bring the price down, yeah, just to, because it is, well they say that it's very good for you, and you should have it so many times during the week, but I don't think the average family could afford to do that, you know, like a family, I've only got my husband and I so you know we're ok, but if you were looking at 3 or 4 kids, wow' (F, FG 6, non-trial participant).

The perceived convenience of fish and seafood was dependant on the type of product consumed. Participants viewed canned fish as being a highly convenient product, particularly as a lunch meal, where it was viewed as being fast and easy to prepare, or for an 'emergency meal'. Frozen fish and specific types of fresh fish such as flathead tails were also described as being convenient varieties of fish. Conversely, other types of fish and seafood such as whole fish and crustaceans were seen as requiring a large amount of time to prepare and eat. Fish and seafood-based meals were also described as requiring greater organisation to prepare than other protein sources.

'Yeah, I was, because I'd buy those, you know, I think the best marketing ploy was when they brought in those little tins of tuna in the different flavours and stuff that you could stick in your lunchbox and, easy fish meal' (F, FG 1, trial participant).

The convenience of specific fish products, such as canned and frozen fish, was discussed more often by those non-trial participants. Others have also reported an effect of age on perception of the difficulty associated with eating seafood, with older participants finding fish and seafood less inconvenient than younger participants.¹²⁻¹⁷ In the present study, there was a higher proportion of participants aged 50 years or older in the trial group than the non-trial group (Table 1). Therefore, it is possible that the older trial participants placed less value on convenient fish products than the younger non-trial participants as they did not perceive fish to be an inconvenient product to begin with.

3.3 Physical and sensory characteristics of fish and seafood

As has been found in previous research,¹⁸ participants' individual taste preferences were reported to substantially affect their willingness to consume fish and seafood. Taste preferences were the most commonly discussed factor influencing fish and seafood consumption in the trial participants, and also ranked highly for non-trial participants. Many participants referred to freshness as being an important issue for fish and seafood, with several participants expressing dislike of fresh fish which had been frozen prior to sale. A number of participants also stated that they felt that they were not adept at determining the freshness of fish and seafood, in comparison with another protein source such as meat.

'We prefer the fish fresh, and if you don't have it for a couple of weeks and you're having stuff out of the freezer, um then you have fresh and you go oohhh, man can't you tell? Yeah, it is much nicer' (F, FG 4, non-trial participant).

Physical characteristics such as appearance, presence of bones and smell also influenced participants' fish consumption. The appearance of a whole fish was something that participants or members of their families found disturbing. Similarly, several University staff members indicated that they had an aversion to the bones found in fish and seafood, and as a result of this, chose boneless fillets where possible, as has also been outlined in previous research in the Australian population.⁹ The smell associated with cooking fresh fish was also a factor which resulted in some participants avoiding these types of fish and seafood.

In addition to also discussing the influence of taste preferences on fish and seafood consumption, trial participants tended to refer to the taste of fish as flavoursome, while a number of non-trial participants discussed their desire to avoid certain flavours when they chose fish and seafood. Consumers with a greater experience of fish have been found to be more likely to view fish and seafood as having a pleasant taste than those who had less experience and were less concerned by the presence of bones in fish.¹⁹ In the present study,

non-trial participants also referred to the presence of bones in fish as being a barrier to regular consumption, while this was rarely mentioned by trial participants. While participants' experience with fish and seafood was not measured in the present study, these findings could suggest that trial participants were more experienced consumers of fish, and thus had different perceptions of taste than non-trial participants. Trial participants were asked about fish consumption patterns and preferences in entering the trial, but non-trial participants were not asked this on entering the focus groups, so there may have been a bias in the focus group sample in this regard.

3.4 Influence of family preferences and past experiences of fish and seafood consumption

Family members' food preferences appeared to influence participants' decisions to consume fish and seafood, and were discussed more often by non-trial participants than participants enrolled in the trial. Many participants stated that their children did not like fish or seafood, making it harder for participants to consume them regularly, or limiting them to specific types of fish, such as fried or frozen varieties, that they would not have otherwise chosen. Other participants stated that the negative reactions of children to fish and seafood made consuming them an unpleasant experience, which resulted in participants avoiding serving them as meals.

'Yeah my, um daughter doesn't particularly like fish, unless you crumb it and tell her it's chicken, then she'll eat it [laughs], even though she then, once she has a bite she goes this isn't chicken, it's fish, she'll then eat it, so it's one of those things that you just kind of start steering away from cos it's just easier than putting up with the complaints' (F, FG 2, trial participant).

This finding is in accordance with much of the previous research, which has highlighted the preferences of children as playing a large role in influencing an individual's decisions on the frequency of fish consumption, as well as the type of fish or seafood consumed.^{9,11,12} In the present study, however, one trial participant stated that as a result of her perceptions of the health benefits of fish, she no longer allowed her children's attitudes to be a barrier to regular fish consumption. It is possible that the nutritional education given during the trial allowed participants to place a higher value on fish consumption, thus displacing the preferences of family members as the main barrier. Other research has found that the presence of teenagers under the age of 18 may detrimentally impact upon the frequency of fish consumption.^{12,18} Although we did not investigate the age of participant's children, a larger number of non-trial participants were under 50 years of age, and may have children still living at home, while trial participants tended to be older.

Participants also referred to family traditions and cultural norms as influencing their frequency of fish and seafood consumption. Participants referred to religious traditions such as having fish on Fridays, cultural traditions, and the attitudes of their parents as influencing their own perceptions of fish and seafood, and affecting the types of fish they chose to consume. Similarly, experiences with fish and seafood as children were also reported as influencing participant's current consumption habits, as has been highlighted in past research in the area¹¹

'... it's a like a long traditional saying, that fish is always good. You know, probably wouldn't be as tasty as you know beef or somehow, but you know in the

conscious Chinese people's mind, fish is always good' (F, FG 6, non-trial participant).

3.5 Cooking skill and role of fish and seafood in cuisine

Many participants from both groups perceived fish and seafood as foods which are difficult to cook, in comparison with meat, as was also reported by McManus *et al.*⁹ Several participants stated they lacked the confidence and knowledge to cook fish and seafood well and as a result, tended not to cook them at home. As a result of this, however, many participants stated that they enjoyed ordering fish and seafood when eating out at a restaurant, which allowed them to have them cooked in more diverse ways than they might attempt. This, as well as the cost of fish and seafood, made them foods that many participants considered to be associated with a 'special occasion', rather than everyday eating.

'and, I don't know, fresh fish, it's difficult to cook, [to other pt] I heard you saying you didn't like cooking fish, it's not, it's not as easy to cook as meat' (F, FG 1, trial participant).

There was a commonly discussed opinion that fish and seafood had a high level of variety as a food choice, which was seen as a favourable quality. Participants from both the trial and non-trial groups referred to the variety fish and seafood added to a meal, the different flavours that could be incorporated with them, and the diversity of some fish products, for example, canned fish. One participant felt that including fish and seafood in her family's diet increased her children's awareness of the variety available and the role of fish and seafood in the diet. Some of the ways fish and seafood could be cooked were also discussed by trial participants, which included cooking methods such as poaching, grilling and baking with herbs.

'and I think that you've got such a variety, I think with meat, it's kind of just all the same [laughs] mostly, you know [laughs] and I think that um with seafood you've got a better variety, you can use different things and there's different tastes, like so many different tastes, it's, it's really good' (F, FG 2, trial participant).

Several participants from both groups expressed the viewpoint that specific types of fish and seafood tended to be associated with certain meals. Many participants stated that canned fish was mostly used for lunch food, whereas fresh fish tended to be limited to the evening meal. Similarly, some participants stated that they viewed canned fish to be a very different product to fresh fish, as a result of its different composition and uses.

'Mainly that I'm not much of a dinner eater anyway, and fish is more or less of a dinner food, when I do have fish it's usually for lunch' (M, FG 6, non-trial participant).

This study is presented as a case study, and as such, results cannot be extrapolated to the wider population, but the principles exposed could be tested in similar settings. While attempts were made to match the non-trial to the trial participants, the age difference in particular may have been a limitation. In addition, while efforts were made to recruit non-academic University staff, this group did have a higher proportion of university-educated participants than the trial participants. However, similar responses between groups in areas such as health knowledge suggest that this did not cause undue bias. Factors such as the presence and age of a participant's children and experience with fish and seafood may have

an indirect impact on perceptions of these foods. Future research in this area might benefit from collecting more dietary data and more detailed information on family circumstances and past experience with fish and seafood as background information. An additional limitation of this study is that some trial participants were given a specific fish consumption prescription, while others were given healthy eating advice which included fish. However, analysis of themes suggested that the attitudes expressed by trial participants were similar, regardless of their study allocation.

This is the first known study to investigate the influence of dietetic education in the context of a clinical trial on perceptions of fish consumption. This study highlighted some of the factors that can influence an individual's abilities and decisions to consume fish and seafood. Fish and seafood were generally perceived as being healthy foods, with convenient varieties available. Individual taste preferences also influenced the type of fish and seafood participants chose to consume. However, perceptions of the price of fish and seafood, food preferences of children, and access to fresh fish appeared to have a negative impact.

The themes which were highlighted by this study were similar between trial and non-trial participants. However, variation in the priority of some factors such as the importance of education and knowledge suggests that the dietary intervention may have influenced the perceptions of trial participants. Factors such as price and availability of fish and seafood were substantial barriers for both groups however, suggesting that dietetic education alone was not able to overcome these issues. While the results of this exploratory study cannot be generalised to the wider population, they suggest that practical strategies combating perceptions of price and availability are required in addition to dietetic education in order to increase fish consumption.

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