

Parental Cooking Confidence is Associated with Children's Intake of Fish and Seafood

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ABSTRACT

Purpose: Fish and seafood consumption by North American children is low. This is concerning, given the critical role of n-3 polyunsaturated fatty acids (eicosapentaenoic acid and docosahexaenoic acid), found in fish and seafood, in early development. This study aimed to determine whether parental factors related to fish and seafood consumption are associated with frequency of fish and seafood consumption in Canadian children.

Methods: A subgroup of parents (n = 28) participating in the Guelph Family Health Study Pilot reported their perceptions and history of fish and seafood consumption, confidence in preparing fish and seafood dishes, and the frequency of intake for their children (n = 40).

Results: This study found that 20% of children consumed one serving of saltwater fish, freshwater fish, or shellfish weekly and 63% consumed at least one type of fish or seafood monthly. Parental cooking confidence preparing fish and seafood was positively associated with at least monthly fish and seafood intake in children.

Conclusions: These findings suggest that some children may have low intakes of fish and seafood due to a lack of parental cooking confidence when preparing fish and seafood dishes. Therefore, future research and interventions focused on addressing this barrier may aid in improving fish and seafood intake.

Key words: food skills, fish, seafood, EPA, DHA, dietary intakes, child intakes, parent intakes, n-3 fatty acids, n-3 PUFA.

(Can J Diet Pract Res. 2024;85:54–57)

(DOI: [10.3148/cjdp-2023-012](https://doi.org/10.3148/cjdp-2023-012))

Published at dcjournal.ca on 5 July 2023

RÉSUMÉ

Objectif. Les enfants nord-américains consomment peu de poisson et de fruits de mer. Cette situation est préoccupante étant donné le rôle essentiel dans le développement de la petite enfance des acides gras polyinsaturés n-3 (acide eicosapentaénoïque et acide docosahexaénoïque) présents dans le poisson et les fruits de mer. Cette étude visait à déterminer si des facteurs parentaux liés à la consommation de poisson et de fruits de mer sont associés à la fréquence de consommation de poisson et de fruits de mer chez les enfants canadiens.

Méthodes. Un sous-groupe de parents (n = 28) participant à l'étude pilote Guelph Family Health Study ont fait part de leurs perceptions et de leur historique en matière de consommation de poisson et de fruits de mer, de leur confiance à préparer des plats à base de poisson et de fruits de mer et de la fréquence de consommation de leurs enfants (n = 40).

Résultats. Cette étude a révélé que 20 % des enfants consommaient une portion de poisson de mer, de poisson d'eau douce ou de crustacés par semaine et que 63 % consommaient au moins un type de poisson ou de fruits de mer par mois. La confiance des parents à préparer du poisson et des fruits de mer était positivement associée à la consommation au moins mensuelle de poisson et de fruits de mer chez les enfants.

Conclusions. Ces résultats suggèrent que certains enfants peuvent avoir une faible consommation de poisson et fruits de mer en raison du manque de confiance des parents à préparer des plats à base de poisson et de fruits de mer. Par conséquent, des recherches et interventions futures axées sur la résolution de cet obstacle pourraient contribuer à améliorer la consommation de poisson et de fruits de mer.

Mots-clés : compétences alimentaires, poisson, fruits de mer, AGPI n-3, apports alimentaires, consommation par les enfants, consommation par les parents, acides gras n-3, AGPI n-3.

(Rev can prat rech diétét. 2024;85:54–57)

(DOI: [10.3148/cjdp-2023-012](https://doi.org/10.3148/cjdp-2023-012))

Publié au dcjournal.ca le 5 juillet 2023

INTRODUCTION

N-3 polyunsaturated fatty acids (PUFA) from fish and seafood play a critical role in early development and long-term disease prevention [1]; however, intakes remain low in many Western countries. Despite recommendations to consume at least two servings of fish or seafood per week [2–4], studies in North American children suggest that >70% of children consume less than one serving of fish and seafood per week [4, 5]. This is concerning, given that early nutrition influences long-term dietary habits [6–8].

Studies in adults have shown that a number of factors impact frequency of fish and seafood intake, including taste, food skills, perceived health benefits, age, education level,

and geographic location [9–13]; these factors have not yet been explored in children. However, it is known that parents play a primary role influencing early dietary habits and perceptions in their children [8, 14], suggesting that parental preference and perception of fish and seafood consumption may contribute to fish and seafood consumption by their children. Understanding the factors that influence fish and seafood consumption in children will help support the development of strategies to improve their children's intake of n-3 PUFA [9, 15]. The purpose of this study was to investigate how parental perceptions of fish and seafood consumption influence the frequency of fish and seafood consumption in Canadian children.

METHODS

This study used cross-sectional data collected from 28 parents (of 40 children) participating in the Guelph Family Health Study pilot, a longitudinal family-based cohort. These parents responded to an online survey administered between March 2019 and May 2020 that assessed parental perceptions and history of fish and seafood consumption, confidence in preparing fish and seafood dishes, and parental and childhood intakes of fish and seafood (Supplemental Table 1¹). Survey questions were adapted from a variety of sources [13, 16–18]. Surveys were completed by one parent per household. Families were eligible to participate in the Guelph Family Health Study pilot if they had at least one child aged 18 months to 5 years at the time of enrolment (children were aged 5–10 years at the time of this study), lived in Wellington County (an inland region located in Ontario, Canada), and had a parent who could respond to questionnaires and surveys in English. This study received approval by the University of Guelph Research Ethics Board (REB14AP008).

Statistical analysis

Parent age and child age were reported as mean \pm standard deviation (minimum–maximum). Ethnicity, household income, and parent highest level of education were reported as frequency (percent). Logistic regression analyses assessed associations between parental variables (Likert scale score) and whether children consumed at least one type of fish and seafood at least once per month (yes or no). Odds ratio estimates (OR) and 95% confidence intervals (CI) were calculated using generalized estimating equations to account for potential correlations among siblings. Statistical analyses were performed using SAS OnDemand for Academics (SAS Institute Inc., Cary, North Carolina, USA).

RESULTS

Participant characteristics

Parent's ages ranged from 28 to 46 years and children's ages ranged from 5 to 10 years (Table 1). Eighty-six percent ($n = 24$) of parents and 90% ($n = 36$) of children identified as white. All parents reported having some postsecondary education, with 48% of parents having postgraduate training. Annual household income ranged from \$40,000 to \$150,000, with 64% of participants having an annual household income over \$100,000.

Fish and seafood intakes of children

Parents indicated that all children consumed fish and seafood at least once annually and 63% ($n = 25$) of children consumed fish and seafood at least once monthly. Saltwater fish was the most common category of seafood consumed; 63% ($n = 25$) of children consumed saltwater fish at least

Table 1. Participant characteristics (28 households, 28 parents, 40 children).

Parent age (years) ^a	39.4 \pm 4.8 (29–46)
Child age (years) ^a	7.3 \pm 1.4 (5.1–9.9)
Parent ethnicity	
White	$n = 24$ (85.7%)
Other	$n = 4$ (14.3%)
Child ethnicity	
White	$n = 36$ (90.0%)
Other	$n = 4$ (10.0%)
Household income (CAD) ^b	
\leq \$99,999	$n = 10$ (35.7%)
$>$ \$100,000	$n = 18$ (64.3%)
Parent highest level of education	
Any postsecondary training, college, or university	$n = 15$ (51.7%)
Postgraduate training	$n = 13$ (48.3%)

^aValues are expressed as mean \pm standard deviation (minimum–maximum).

^bHousehold income was reported for 28 families.

once monthly and 20% ($n = 8$) of children consumed saltwater fish at least once weekly. In the freshwater fish category, 23% ($n = 9$) of children consumed freshwater fish at least once monthly and no children consumed freshwater fish at least once weekly. For the shellfish category, 33% ($n = 13$) of children consumed shellfish at least once monthly and <5 children consumed shellfish at least once weekly.

Associations between parent variables and child fish and seafood intake

Parental fish and seafood cooking confidence (OR = 1.91, 95% CI [1.21, 3.03]) (Table 2 and Supplemental Table 1¹) were significantly ($p < 0.05$) and positively associated with monthly child fish and seafood intake. No other parental factors were associated with child fish and seafood intake.

DISCUSSION

This pilot study examined frequency of intake and parental factors associated with fish and seafood intake in Canadian children. Previous studies have shown that dietary intakes of n -3 PUFA from fish and seafood sources by North American children are low. Many children do not meet the recommendations for these fatty acids [19] from 2 servings of fish or seafood per week [4, 5, 20]. In this study, 80% of children in this study consumed less than one serving per week per category of fish or seafood.

This study found that 63% ($n = 25$) of children consumed fish and seafood at least once per month. Of these children,

¹Supplementary data are available with the article at <https://dcjournal.ca/doi/suppl/10.3148/cjdpr-2023-012>.

Table 2. Logistic regression results of at least monthly child fish and seafood consumption on parental fish and seafood consumption, parental perceptions surrounding fish and seafood consumption, and parental fish and seafood consumption (28 parents, 40 children).

Parental variable	Mean survey response	Association with child intake, odds ratio (95% CI)
Parental history of fish and seafood consumption (1)	2.9 ± 1.6	1.20 (0.72, 1.99) <i>p</i> = 0.48
Perceived time commitment when preparing fish and seafood dishes (2)	4.1 ± 1.0	0.77 (0.32, 1.85) <i>p</i> = 0.56
Cooking confidence when preparing fish and seafood dishes (3)	3.2 ± 1.7	1.91 (1.21, 3.03) <i>p</i> = 0.006
Perceived health benefits of consuming fish and seafood (4)	4.8 ± 0.4	1.46 (0.25, 8.36) <i>p</i> = 0.67

Note: Parental variables are reported as description of variable and corresponding survey question number in parentheses (Supplemental Table 1¹).

20 parents also reported consuming fish and seafood at least once per month (Supplemental Table 1¹), suggesting that parental intakes of fish and seafood are reflective of child intake. Previous studies have shown that parents’ modelling of healthy food behaviours improves nutrition outcomes in children [21]; thus, modelling of fish and seafood consumption by parents may be an effective strategy to increase fish and seafood intake by children.

Additionally, this study found that parental cooking confidence was positively associated with child intakes of fish and seafood (OR = 1.91, 95% CI [1.21, 3.03]). This agrees with earlier findings which have shown that cooking competency when preparing fish and seafood meals is a driver of fish and seafood consumption [9, 22]. These findings suggest that to increase fish and seafood consumption, families may require support and education around recipes and food skills to increase their cooking confidence when preparing these dishes at home.

Our findings shed light on possible new research directions. However, there are some limitations, including low variability in parental age, ethnic diversity, education level, and socioeconomic status, as well as low sample size and focused geographic location, as Wellington County is an inland region located in Ontario, Canada. Additionally, parents were not asked if any family members had fish or seafood allergies, which may impact intake.

RELEVANCE TO PRACTICE

Fish and seafood are important sources of n-3 PUFA, which have an important role in early development and health, but are consumed in low amounts in children. This pilot study identifies improving cooking confidence in parents as a potential strategy to increase fish and seafood intake in their children and provides new direction for future research.

Acknowledgments

We would like to express our sincere gratitude to the participating families, the research team of the Guelph Family Health Study, and to Angela Annis for their support of this research.

Funding: This research was funded by The Helderleigh Foundation and Canadian Institutes for Health Research.

Conflict of interest: The authors declare no conflict of interest.

REFERENCES

- De Boo HA, Harding JE. The developmental origins of adult disease (Barker) hypothesis. Aust New Zeal J Obstet Gynaecol. 2006 Feb; 46(1):4–14. doi: 10.1111/j.1479-828X.2006.00506.x.
- Kris-Etherton PM, Harris WS, Appel LJ. Omega-3 fatty acids and cardiovascular disease: New recommendations from the American Heart Association. Arterioscler Thromb Vasc Biol. 2003;23(2):151–152. PMID: 12588750. doi: 10.1161/01.ATV.0000057393.97337.AE.
- Health Canada. Prenatal Nutrition Guidelines for Health Professionals - Fish and Omega-3 Fatty Acids - Canada.ca [Internet]. [cited 2020 Nov 26]. Available from: https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/fn-an/alt_formats/hpfb-dgpsa/pdf/pubs/omega3-eng.pdf
- Imm P, Knobloch L, Anderson HA. Maternal recall of children’s consumption of commercial and sport-caught fish: Findings from a multi-state study. Environ Res. 2007;103(2):198–204. PMID: 16828736. doi: 10.1016/j.envres.2006.05.011.
- Lien VW, Clandinin MT. Dietary Assessment of Arachidonic Acid and Docosahexaenoic Acid Intake in 4-7 Year-Old Children. J Am Coll Nutr. 2009;28(1):7–15. PMID: 19571154. doi: 10.1080/07315724.2009.10719755.
- Haines J, Douglas S, Mirotta JA, O’Kane C, Breau R, Walton K, et al. Guelph Family Health Study: pilot study of a home-based obesity prevention intervention. Can J Public Heal. 2018;109(4):549–560. doi: 10.17269/s41997-018-0072-3.
- Singer MR, Moore LL, Garrahe EJ, Ellison RC. The tracking of nutrient intake in young children: The Framingham Children’s Study. Am J Public Health. 1995;85(12):1673–1677. PMID: 7503343. doi: 10.2105/AJPH.85.12.1673.
- Birch L, Savage JS, Ventura A. Influences on the Development of Children’s Eating Behaviours: From Infancy to Adolescence. Can J Diet Pract Res. 2007;68(1):s1–s6. PMID: 19430591.
- Neale EP, Nolan-Clarke D, Probst YC, Batterham MJ, Tapsell LC. Comparing attitudes to fish consumption between clinical trial

- participants and non-trial individuals. *Nutr Diet*. 2012;69(2):124–129. doi: [10.1111/j.1747-0080.2012.01585.x](https://doi.org/10.1111/j.1747-0080.2012.01585.x).
10. Christenson JK, O’Kane GM, Farmery AK, McManus A. The barriers and drivers of seafood consumption in Australia: A narrative literature review. *Int J Consum Stud*. 2017;41(3):299–311. doi: [10.1111/ijcs.12342](https://doi.org/10.1111/ijcs.12342).
 11. Cisneros-Montemayor AM, Pauly D, Weatherdon LV., Ota Y. A global estimate of seafood consumption by coastal indigenous peoples. *PLoS One*. 2016;11(12). doi: [10.1371/journal.pone.0166681](https://doi.org/10.1371/journal.pone.0166681).
 12. Verbeke W, Vackier I. Individual determinants of fish consumption: Application of the theory of planned behaviour. *Appetite*. 2005; 44(1):67–82. PMID: [15604034](https://pubmed.ncbi.nlm.nih.gov/15604034/). doi: [10.1016/j.appet.2004.08.006](https://doi.org/10.1016/j.appet.2004.08.006).
 13. Pieniak Z, Verbeke W, Scholderer J. Health-related beliefs and consumer knowledge as determinants of fish consumption. *J Hum Nutr Diet*. 2010;23(5):480–488. PMID: [20831707](https://pubmed.ncbi.nlm.nih.gov/20831707/). doi: [10.1111/j.1365-277X.2010.01045.x](https://doi.org/10.1111/j.1365-277X.2010.01045.x).
 14. Vereecken C, Legiest E, De Bourdeaudhuij I, Maes L. Nutrition: Associations between general parenting styles and specific food-related parenting practices and children’s food consumption. *Am J Heal Promot*. 2009;23(4):233–240. doi: [10.4278/ajhp.07061355](https://doi.org/10.4278/ajhp.07061355).
 15. Lawley M. A Final Seafood Omnibus: Evaluating changes in Consumer attitudes and behaviours [Internet]. 2015 [cited 2021 Mar 28]. Available from: www.seafoodcrc.com
 16. Birch D, Lawley M. The Role of Habit, Childhood Consumption, Familiarity, and Attitudes Across Seafood Consumption Segments in Australia. *J Food Prod Mark*. 2014 Jan;20(1):98–113. doi: [10.1080/10454446.2012.732548](https://doi.org/10.1080/10454446.2012.732548).
 17. Olsen SO. Understanding the relationship between age and seafood consumption: The mediating role of attitude, health and involvement and convenience. *Food Qual Prefer*. 2003;14(3):199–209. doi: [10.1016/S0950-3293\(02\)00055-1](https://doi.org/10.1016/S0950-3293(02)00055-1).
 18. Myrland Ø, Trondsen T, Johnston RS, Lund E. Determinants of seafood consumption in Norway: Lifestyle, revealed preferences, and barriers to consumption. *Food Qual Prefer*. 2000 May 1;11(3):169–188. doi: [10.1016/S0950-3293\(99\)00034-8](https://doi.org/10.1016/S0950-3293(99)00034-8).
 19. Otten JJ, Hellwig JP, Meyers LD. DRI, dietary reference intakes: the essential guide to nutrient requirements. Washington D.C: National Academies Press; 2006. 543 p.
 20. Burns JL, Mirotta JA, Duncan AM, Darlington G, Haines J, Shivappa N, et al. Intakes of PUFA are low in preschool-aged children in the Guelph family health study pilot cohort. *Appl Physiol Nutr Metab*. 2022; In Press.
 21. Watterworth JC, Hutchinson JM, Buchholz AC, Darlington G, Simpson JAR, Ma DWL, et al. Food parenting practices and their association with child nutrition risk status: Comparing mothers and fathers. *Appl Physiol Nutr Metab*. 2017;42(6):667–671. PMID: [28196327](https://pubmed.ncbi.nlm.nih.gov/28196327/). doi: [10.1139/apnm-2016-0572](https://doi.org/10.1139/apnm-2016-0572).
 22. McManus A, Burns SK, Howat PA, Cooper L, Fielder L. Factors influencing the consumption of seafood among young children in Perth: A qualitative study. *BMC Public Health*. 2007 Jun 25;7(1):1–7. doi: [10.1186/1471-2458-7-1](https://doi.org/10.1186/1471-2458-7-1).