

Comprehension and Use of Nutrition Facts Tables among Adolescents and Young Adults in Canada

ERIN HOBIN, PhD^a; GRACE SHEN-TU, PhD^a; JOCELYN SACCO, PhD^a; CHRISTINE WHITE, MSC^b; CAROLYN BOWMAN, MSC^a; JUDY SHEESHKA, PhD^c; GAIL MCVEY, PhD^d; MARY FODOR O'BRIEN, MHSC^a; LANA VANDERLEE, PhD^b; DAVID HAMMOND, PhD^b

^aPublic Health Ontario, University Avenue, Toronto, ON; ^bSchool of Public Health and Health Systems, University of Waterloo, Waterloo, ON; ^cDietetics, Nutrition, and Food Science, Victoria University, Melbourne, VIC; ^dThe Hospital for Sick Children, Toronto, ON

ABSTRACT

Purpose: Limited evidence exists on the comprehension and use of Nutrition Facts tables (NFT) among adolescents and young adults. This study provides an account of how young people engage with, understand, and apply nutrition information on the current and modified versions of the NFT to compare and choose foods.

Methods: Participants aged 16–24 years ($n = 26$) were asked to “think aloud” while viewing either the current or 1 of 5 modified NFTs and completing a behavioural task. The task included a questionnaire with 9 functional items requiring participants to define, compare, interpret, and manipulate serving size and percentage daily value (%DV) information on NFTs. Semi-structured interviews were conducted to further probe thought processes and difficulties experienced in completing the task.

Results: Equal serving sizes on NFTs improved ability to accurately compare nutrition information between products. Most participants could define %DV and believed it can be used to compare foods, yet some confusion persisted when interpreting %DVs and manipulating serving-size information on NFTs. Where serving sizes were unequal, mathematical errors were often responsible for incorrect responses.

Conclusions: Results reinforce the need for equal serving sizes on NFTs of similar products and highlight young Canadians’ confusion when using nutrition information on NFTs.

(Can J Diet Pract Res. 2016;77:59–65)

(DOI: 10.3148/cjdpr-2015-042)

Published at dcjournal.ca on 15 January 2016.

RÉSUMÉ

Objectif. Il existe peu de données probantes sur la compréhension et l'utilisation des tableaux de la valeur nutritive (TVN) chez les adolescents et les jeunes adultes. La présente étude donne un aperçu de la façon dont les jeunes abordent, comprennent et appliquent l'information nutritionnelle figurant sur les versions actuelles et modifiées des TVN pour comparer et choisir leurs aliments.

Méthodes. On a demandé à des participants âgés de 16 à 24 ans ($n = 26$) de « réfléchir à voix haute » pendant qu'ils regardaient la version actuelle ou l'une des cinq versions modifiées des TVN et qu'ils réalisaient une tâche comportementale. La tâche consistait notamment à répondre à un questionnaire comportant 9 éléments fonctionnels dans lequel on demandait aux participants de définir, de comparer, d'interpréter et de manipuler la taille des portions et l'information concernant le pourcentage de la valeur quotidienne (%VQ) figurant sur les TVN. On a mené des entrevues semi-structurées pour en savoir plus sur le processus cognitif et les difficultés éprouvées pendant l'exécution de la tâche.

Résultats. Les tailles des portions égales sur les TVN amélioraient la capacité à comparer avec précision l'information nutritionnelle entre les produits. La plupart des participants pouvaient définir le %VQ et étaient d'avis qu'il pouvait servir à comparer les aliments. Toutefois, une certaine confusion demeurait lors de l'interprétation des %VQ et de la manipulation de l'information concernant la taille des portions figurant sur les TVN. Lorsque les tailles des portions n'étaient pas les mêmes, des erreurs mathématiques ont mené, dans de nombreux cas, à des réponses incorrectes.

Conclusions. Les résultats appuient la nécessité d'indiquer des tailles de portions égales sur les TVN des produits similaires et mettent en évidence la confusion parmi les jeunes Canadiens lorsqu'ils utilisent l'information nutritionnelle figurant sur les TVN.

(Rev can prat rech diétét. 2016;77:59–65)

(DOI: 10.3148/cjdpr-2015-042)

Publié au dcjournal.ca le 15 janvier 2016.

INTRODUCTION

Dietary intakes of Canadian adolescents and young adults are not aligned with current recommendations [1]. The majority of young people do not meet guidelines for fruit and vegetable consumption, and intakes of saturated fat and sodium remain suboptimal [1–4]. Furthermore, between 1978 and 1979 and 2007 and 2009, rates of obesity tripled for youth and doubled for young adults [5, 6]. Young Canadians’ dietary intake may have long-term health impacts that persist throughout adulthood [7–9]. Given the transition from adolescence to adulthood is characterized by increasing independence and a

growing responsibility for food purchasing decisions, this is a critical period for intervention [9].

Nutrition labelling is recognized as an important approach to support consumers in making healthier dietary choices [10, 11]. Nutrition Facts tables (NFTs), which are required to be displayed on most prepackaged foods in Canada, are intended to enable consumers to easily compare between products and to inform food choices [12]. The ability of NFTs to support informed food choices is grounded in the assumption that individuals can comprehend and use information on the NFT. Although self-reported data suggest that 71% of

Canadian adults use the NfT [13], comprehension is low, and many Canadian adults have difficulty comparing nutrition information across similar foods owing to different serving sizes listed on NfTs [14]. Moreover, most Canadian adults are unable to interpret or apply percentage daily value (%DV) information to identify whether a food has “a little” or “a lot” of certain nutrients [14]. This is consistent with what has been observed internationally [15–17]. In recognition of these limitations, the NfT format is currently under review in Canada [18], providing a unique opportunity to inform the development of NfT revisions.

The purpose of this study was to provide an in-depth account of young people’s thought processes when using nutrition information on the current and modified versions of the NfT to compare and choose foods. A qualitative methodology was chosen to better understand how young people engage with information on the NfT and to provide an opportunity for young people to discuss their understanding of and needs for nutrition information in more detail than typically allowed in traditional surveys.

METHODS

Participants

A convenient sample of 26 participants aged 16–24 years from southwestern Ontario was recruited for this study. Sample size was determined by saturation and budget limitations. Because previous work has found differences in NfT comprehension and use between genders [15], an equal number of males and females and an equal number of adolescents (16–18 years) and young adults (19–24 years) were sampled. Participants were recruited from community settings (e.g., shopping centres, skateboard parks) using flyers. Ethical approval for the study was obtained from the University of Waterloo Ethics Board. Written informed consent was obtained and all participants received \$25 as an incentive.

Study design

A verbal protocol technique “Think Aloud” and semi-structured interviews were combined with randomized stimulus conditions typically associated with experimental research [19]. The design of fusing elements of experimental design within qualitative data collection methods is labelled a hybrid methodological technique [20]. Participants were randomized to view NfTs for 2 hypothetical brands of crackers according to their assigned condition and asked to think aloud while participating in a behavioural task that included a questionnaire with 9 functional items; this was followed by semi-structured interviews. The purpose of incorporating stimulus conditions within this qualitative research was to expose participants to a variety of stimuli, allowing for an open exchange about and elaboration of the process where young people engage with and apply their nutrition information knowledge on modified NfTs. These responses are then expanded through

semi-structured interviews. The current study was not intended to be used to identify statistical relationships. Crackers were used for this study because they are a widely consumed snack product with broad appeal and the nutritional quality of crackers is generally perceived as ambiguous (i.e., neither healthy nor unhealthy).

Modifications to NfTs

Current regulations in Canada allow manufacturers flexibility in determining serving sizes listed on NfTs [21]. This flexibility leads to unequal serving sizes displayed on NfTs of similar products and increases the complexity of product comparisons. Therefore, NfTs with unequal serving sizes were compared with the listing of “equal” serving sizes across products. Different formats for displaying %DV information on NfTs, including simple “LOW, MED, HIGH” descriptors and/or the addition of colour coding were also part of the design comparisons in this study (Figure 1). Given that consumers consult NfTs for negative nutrients more frequently than positive nutrients, the NfT labelling formats tested in this research were applied to calories and negative nutrients only (i.e., total fat, saturated fat, and sodium) [22]. Also, there is strong evidence supporting the association between negative nutrients and increased risk for disease [23]. The nutritional values displayed on the NfTs were similar to actual cracker brands, but manipulated so that 1 option was high ($\geq 15\%$ DV) or moderate (6%–14% DV) and 1 option was low ($\leq 5\%$ DV) in sodium per serving [24], based on the adequate intake level of 1500 mg/day [25].

Behavioural task

A member of the research team led the task and interviews with all participants in summer 2012. An equal number of male and female adolescents and young adults were randomly assigned to view either the current or 1 of the 5 modified NfTs. Prior to beginning the behavioural task, participants completed a practice session to familiarize themselves with the think aloud technique [19], where they were asked to virtually walk through their home and count, out loud, the number of windows or doors.

To investigate the process for comprehending and using the NfTs, participants were provided with 2 NfTs according to their assigned condition and asked to think aloud while completing a questionnaire with 9 functional items. Validated and previously published measures were employed to examine 4 primary outcomes, including participants’ ability to interpret, define, compare, and manipulate serving size and %DV information on NfTs (Supplementary Table 1¹) [14, 26]. Participants were encouraged to speak openly throughout the task with minimal researcher support, with the exception of probing participants to discuss their thought processes or any difficulties experienced during the task. Paper and pencils/pens were available, but calculators were not provided. The use of

¹Supplementary data are available with the article through the journal Web site at <http://dcjournal.ca/www.nrcresearchpress.com/doi/suppl/10.3148/cjdr-2015-042>.

Figure 1. Six Nutrition Facts Table Conditions. Each participant viewed

1 set of products with the current Nutrition Facts table or 1 of 5 modified Nutrition Facts tables: condition 1, current format mandated in Canada; condition 2, current format with equal serving sizes; condition 3, addition of LOW, MED, HIGH descriptors for fat and sodium; condition 4, LOW, MED, HIGH descriptors with equal serving sizes; condition 5, LOW, MED, HIGH descriptors and green, amber, red colour coding; condition 6, LOW, MED, HIGH descriptors and green, amber, red colour coding with equal serving sizes.

	Current Serving Size Regulations		Equal Serving Sizes																																																																																																																																	
	CONDITION #1 – Current NFT		CONDITION #2 - Equal Serving Size																																																																																																																																	
	Product A	Product B	Product A	Product B																																																																																																																																
% DV only	<p>Nutrition Facts / Valeur nutritive Per: 19 crackers (20g) /par 19 craquelins (20g)</p> <table border="1"> <tr><th>Amount</th><th>% Daily Value</th></tr> <tr><td>Teneur</td><td>% valeur quotidienne</td></tr> <tr><td>Calories / Calories 100</td><td></td></tr> <tr><td>Fat / Lipides 3.5g</td><td>5%</td></tr> <tr><td>Saturated/ saturates 1g</td><td>5%</td></tr> <tr><td>+ Trans / trans 0g</td><td></td></tr> <tr><td>Cholesterol/ Cholesterol 4mg</td><td></td></tr> <tr><td>Sodium/Sodium 140mg</td><td>9%</td></tr> <tr><td>Carbohydrate/Glucides 13g</td><td>4%</td></tr> <tr><td>Fibre 1g</td><td>4%</td></tr> <tr><td>Sugars 1g</td><td></td></tr> <tr><td>Protein 3g</td><td></td></tr> <tr><td>Vit A/Vit A</td><td>2%</td></tr> <tr><td>Vit C/Vit C</td><td>0%</td></tr> <tr><td>Calcium/Calcium</td><td>6%</td></tr> <tr><td>Iron/Fer</td><td>6%</td></tr> </table>	Amount	% Daily Value	Teneur	% valeur quotidienne	Calories / Calories 100		Fat / Lipides 3.5g	5%	Saturated/ saturates 1g	5%	+ Trans / trans 0g		Cholesterol/ Cholesterol 4mg		Sodium/Sodium 140mg	9%	Carbohydrate/Glucides 13g	4%	Fibre 1g	4%	Sugars 1g		Protein 3g		Vit A/Vit A	2%	Vit C/Vit C	0%	Calcium/Calcium	6%	Iron/Fer	6%	<p>Nutrition Facts / Valeur nutritive Per: 7 crackers (30g) /par 7 craquelins (30g)</p> <table border="1"> <tr><th>Amount</th><th>% Daily Value</th></tr> <tr><td>Teneur</td><td>% valeur quotidienne</td></tr> <tr><td>Calories / Calories 145</td><td></td></tr> <tr><td>Fat / Lipides 2.6g</td><td>4%</td></tr> <tr><td>Saturated/ saturates 0.8g</td><td>4%</td></tr> <tr><td>+ Trans / trans 0g</td><td></td></tr> <tr><td>Cholesterol/ Cholesterol 4mg</td><td></td></tr> <tr><td>Sodium/Sodium 60mg</td><td>4%</td></tr> <tr><td>Carbohydrate/ Glucides 19g</td><td>6%</td></tr> <tr><td>Fibre 1g</td><td>4%</td></tr> <tr><td>Sugars 5g</td><td></td></tr> <tr><td>Protein 2g</td><td></td></tr> <tr><td>Vit A/Vit A</td><td>2%</td></tr> <tr><td>Vit C/Vit C</td><td>0%</td></tr> <tr><td>Calcium/Calcium</td><td>6%</td></tr> <tr><td>Iron/Fer</td><td>6%</td></tr> </table>	Amount	% Daily Value	Teneur	% valeur quotidienne	Calories / Calories 145		Fat / Lipides 2.6g	4%	Saturated/ saturates 0.8g	4%	+ Trans / trans 0g		Cholesterol/ Cholesterol 4mg		Sodium/Sodium 60mg	4%	Carbohydrate/ Glucides 19g	6%	Fibre 1g	4%	Sugars 5g		Protein 2g		Vit A/Vit A	2%	Vit C/Vit C	0%	Calcium/Calcium	6%	Iron/Fer	6%	<p>Nutrition Facts / Valeur nutritive Per: 32 crackers (30g)/par 32 craquelins (30g)</p> <table border="1"> <tr><th>Amount</th><th>% Daily Value</th></tr> <tr><td>Teneur</td><td>% valeur quotidienne</td></tr> <tr><td>Calories / Calories 154</td><td></td></tr> <tr><td>Fat / Lipides 2.1g</td><td>4%</td></tr> <tr><td>Saturated/ saturates 0.4g</td><td>4%</td></tr> <tr><td>+ Trans / trans 0g</td><td></td></tr> <tr><td>Cholesterol/ Cholesterol 5mg</td><td></td></tr> <tr><td>Sodium/Sodium 240mg</td><td>16%</td></tr> <tr><td>Carbohydrate/ Glucides 20g</td><td>7%</td></tr> <tr><td>Fibre 1.75g</td><td>4%</td></tr> <tr><td>Sugars 1.4g</td><td></td></tr> <tr><td>Protein 2.8g</td><td></td></tr> <tr><td>Vit A/Vit A</td><td>2%</td></tr> <tr><td>Vit C/Vit C</td><td>0%</td></tr> <tr><td>Calcium/Calcium</td><td>6%</td></tr> <tr><td>Iron/Fer</td><td>6%</td></tr> </table>	Amount	% Daily Value	Teneur	% valeur quotidienne	Calories / Calories 154		Fat / Lipides 2.1g	4%	Saturated/ saturates 0.4g	4%	+ Trans / trans 0g		Cholesterol/ Cholesterol 5mg		Sodium/Sodium 240mg	16%	Carbohydrate/ Glucides 20g	7%	Fibre 1.75g	4%	Sugars 1.4g		Protein 2.8g		Vit A/Vit A	2%	Vit C/Vit C	0%	Calcium/Calcium	6%	Iron/Fer	6%	<p>Nutrition Facts / Valeur nutritive Per: 7 crackers (30g) /par 7 craquelins (30g)</p> <table border="1"> <tr><th>Amount</th><th>% Daily Value</th></tr> <tr><td>Teneur</td><td>% valeur quotidienne</td></tr> <tr><td>Calories / Calories 145</td><td></td></tr> <tr><td>Fat / Lipides 2.6g</td><td>4%</td></tr> <tr><td>Saturated/ saturates 0.8g</td><td>4%</td></tr> <tr><td>+ Trans / trans 0g</td><td></td></tr> <tr><td>Cholesterol/ Cholesterol 4mg</td><td></td></tr> <tr><td>Sodium/Sodium 60mg</td><td>4%</td></tr> <tr><td>Carbohydrate/ Glucides 19g</td><td>6%</td></tr> <tr><td>Fibre 1g</td><td>4%</td></tr> <tr><td>Sugars 5g</td><td></td></tr> <tr><td>Protein 2g</td><td></td></tr> <tr><td>Vit A/Vit A</td><td>2%</td></tr> <tr><td>Vit C/Vit C</td><td>0%</td></tr> <tr><td>Calcium/Calcium</td><td>6%</td></tr> <tr><td>Iron/Fer</td><td>6%</td></tr> </table>	Amount	% Daily Value	Teneur	% valeur quotidienne	Calories / Calories 145		Fat / Lipides 2.6g	4%	Saturated/ saturates 0.8g	4%	+ Trans / trans 0g		Cholesterol/ Cholesterol 4mg		Sodium/Sodium 60mg	4%	Carbohydrate/ Glucides 19g	6%	Fibre 1g	4%	Sugars 5g		Protein 2g		Vit A/Vit A	2%	Vit C/Vit C	0%	Calcium/Calcium	6%	Iron/Fer	6%
	Amount	% Daily Value																																																																																																																																		
Teneur	% valeur quotidienne																																																																																																																																			
Calories / Calories 100																																																																																																																																				
Fat / Lipides 3.5g	5%																																																																																																																																			
Saturated/ saturates 1g	5%																																																																																																																																			
+ Trans / trans 0g																																																																																																																																				
Cholesterol/ Cholesterol 4mg																																																																																																																																				
Sodium/Sodium 140mg	9%																																																																																																																																			
Carbohydrate/Glucides 13g	4%																																																																																																																																			
Fibre 1g	4%																																																																																																																																			
Sugars 1g																																																																																																																																				
Protein 3g																																																																																																																																				
Vit A/Vit A	2%																																																																																																																																			
Vit C/Vit C	0%																																																																																																																																			
Calcium/Calcium	6%																																																																																																																																			
Iron/Fer	6%																																																																																																																																			
Amount	% Daily Value																																																																																																																																			
Teneur	% valeur quotidienne																																																																																																																																			
Calories / Calories 145																																																																																																																																				
Fat / Lipides 2.6g	4%																																																																																																																																			
Saturated/ saturates 0.8g	4%																																																																																																																																			
+ Trans / trans 0g																																																																																																																																				
Cholesterol/ Cholesterol 4mg																																																																																																																																				
Sodium/Sodium 60mg	4%																																																																																																																																			
Carbohydrate/ Glucides 19g	6%																																																																																																																																			
Fibre 1g	4%																																																																																																																																			
Sugars 5g																																																																																																																																				
Protein 2g																																																																																																																																				
Vit A/Vit A	2%																																																																																																																																			
Vit C/Vit C	0%																																																																																																																																			
Calcium/Calcium	6%																																																																																																																																			
Iron/Fer	6%																																																																																																																																			
Amount	% Daily Value																																																																																																																																			
Teneur	% valeur quotidienne																																																																																																																																			
Calories / Calories 154																																																																																																																																				
Fat / Lipides 2.1g	4%																																																																																																																																			
Saturated/ saturates 0.4g	4%																																																																																																																																			
+ Trans / trans 0g																																																																																																																																				
Cholesterol/ Cholesterol 5mg																																																																																																																																				
Sodium/Sodium 240mg	16%																																																																																																																																			
Carbohydrate/ Glucides 20g	7%																																																																																																																																			
Fibre 1.75g	4%																																																																																																																																			
Sugars 1.4g																																																																																																																																				
Protein 2.8g																																																																																																																																				
Vit A/Vit A	2%																																																																																																																																			
Vit C/Vit C	0%																																																																																																																																			
Calcium/Calcium	6%																																																																																																																																			
Iron/Fer	6%																																																																																																																																			
Amount	% Daily Value																																																																																																																																			
Teneur	% valeur quotidienne																																																																																																																																			
Calories / Calories 145																																																																																																																																				
Fat / Lipides 2.6g	4%																																																																																																																																			
Saturated/ saturates 0.8g	4%																																																																																																																																			
+ Trans / trans 0g																																																																																																																																				
Cholesterol/ Cholesterol 4mg																																																																																																																																				
Sodium/Sodium 60mg	4%																																																																																																																																			
Carbohydrate/ Glucides 19g	6%																																																																																																																																			
Fibre 1g	4%																																																																																																																																			
Sugars 5g																																																																																																																																				
Protein 2g																																																																																																																																				
Vit A/Vit A	2%																																																																																																																																			
Vit C/Vit C	0%																																																																																																																																			
Calcium/Calcium	6%																																																																																																																																			
Iron/Fer	6%																																																																																																																																			
% DV + LOW, MED, HIGH Descriptors	CONDITION #3 - LOW, MED, HIGH Descriptors for %DV		CONDITION #4 - Equal Serving Size + LOW, MED, HIGH Descriptors for %DV																																																																																																																																	
	<p>Nutrition Facts / Valeur nutritive Per: 19 crackers (20g) /par 19 craquelins (20g)</p> <table border="1"> <tr><th>Amount</th><th>% Daily Value</th></tr> <tr><td>Teneur</td><td>% valeur quotidienne</td></tr> <tr><td>Calories / Calories 100</td><td>*LOW</td></tr> <tr><td>Fat / Lipides 3.5g</td><td>*LOW 5%</td></tr> <tr><td>Saturated/ saturates 1g</td><td>*LOW 5%</td></tr> <tr><td>+ Trans / trans 0g</td><td></td></tr> <tr><td>Cholesterol/ Cholesterol 4mg</td><td></td></tr> <tr><td>Sodium/Sodium 140mg</td><td>*MED 9%</td></tr> <tr><td>Carbohydrate/Glucides 13g</td><td>4%</td></tr> <tr><td>Fibre 1g</td><td>4%</td></tr> <tr><td>Sugars 1g</td><td></td></tr> <tr><td>Protein 3g</td><td></td></tr> <tr><td>Vit A/Vit A</td><td>2%</td></tr> <tr><td>Vit C/Vit C</td><td>0%</td></tr> <tr><td>Calcium/Calcium</td><td>6%</td></tr> <tr><td>Iron/Fer</td><td>6%</td></tr> </table> <p>LOW, MED, HIGH indicate the amount of each nutrient per serving. You may want less of these nutrients in your daily diet.</p>	Amount	% Daily Value	Teneur	% valeur quotidienne	Calories / Calories 100	*LOW	Fat / Lipides 3.5g	*LOW 5%	Saturated/ saturates 1g	*LOW 5%	+ Trans / trans 0g		Cholesterol/ Cholesterol 4mg		Sodium/Sodium 140mg	*MED 9%	Carbohydrate/Glucides 13g	4%	Fibre 1g	4%	Sugars 1g		Protein 3g		Vit A/Vit A	2%	Vit C/Vit C	0%	Calcium/Calcium	6%	Iron/Fer	6%	<p>Nutrition Facts / Valeur nutritive Per: 7 crackers (30g) /par 7 craquelins (30g)</p> <table border="1"> <tr><th>Amount</th><th>% Daily Value</th></tr> <tr><td>Teneur</td><td>% valeur quotidienne</td></tr> <tr><td>Calories / Calories 145</td><td>*MED</td></tr> <tr><td>Fat / Lipides 2.6g</td><td>*LOW 4%</td></tr> <tr><td>Saturated/ saturates 0.8g</td><td>*LOW 4%</td></tr> <tr><td>+ Trans / trans 0g</td><td></td></tr> <tr><td>Cholesterol/ Cholesterol 4mg</td><td></td></tr> <tr><td>Sodium/Sodium 60mg</td><td>*LOW 4%</td></tr> <tr><td>Carbohydrate/ Glucides 19g</td><td>6%</td></tr> <tr><td>Fibre 1g</td><td>4%</td></tr> <tr><td>Sugars 5g</td><td></td></tr> <tr><td>Protein 2g</td><td></td></tr> <tr><td>Vit A/Vit A</td><td>2%</td></tr> <tr><td>Vit C/Vit C</td><td>0%</td></tr> <tr><td>Calcium/Calcium</td><td>6%</td></tr> <tr><td>Iron/Fer</td><td>6%</td></tr> </table> <p>LOW, MED, HIGH indicate the amount of each nutrient per serving. You may want less of these nutrients in your daily diet.</p>	Amount	% Daily Value	Teneur	% valeur quotidienne	Calories / Calories 145	*MED	Fat / Lipides 2.6g	*LOW 4%	Saturated/ saturates 0.8g	*LOW 4%	+ Trans / trans 0g		Cholesterol/ Cholesterol 4mg		Sodium/Sodium 60mg	*LOW 4%	Carbohydrate/ Glucides 19g	6%	Fibre 1g	4%	Sugars 5g		Protein 2g		Vit A/Vit A	2%	Vit C/Vit C	0%	Calcium/Calcium	6%	Iron/Fer	6%	<p>Nutrition Facts / Valeur nutritive Per: 32 crackers (30g)/par 32 craquelins (30g)</p> <table border="1"> <tr><th>Amount</th><th>% Daily Value</th></tr> <tr><td>Teneur</td><td>% valeur quotidienne</td></tr> <tr><td>Calories / Calories 154</td><td>*MED</td></tr> <tr><td>Fat / Lipides 2.1g</td><td>*LOW 4%</td></tr> <tr><td>Saturated/ saturates 0.4g</td><td>*LOW 4%</td></tr> <tr><td>+ Trans / trans 0g</td><td></td></tr> <tr><td>Cholesterol/ Cholesterol 5mg</td><td></td></tr> <tr><td>Sodium/Sodium 240mg</td><td>*HIGH 16%</td></tr> <tr><td>Carbohydrate/ Glucides 20g</td><td>7%</td></tr> <tr><td>Fibre 1.75g</td><td>4%</td></tr> <tr><td>Sugars 1.4g</td><td></td></tr> <tr><td>Protein 2.8g</td><td></td></tr> <tr><td>Vit A/Vit A</td><td>2%</td></tr> <tr><td>Vit C/Vit C</td><td>0%</td></tr> <tr><td>Calcium/Calcium</td><td>6%</td></tr> <tr><td>Iron/Fer</td><td>6%</td></tr> </table> <p>LOW, MED, HIGH indicate the amount of each nutrient per serving. You may want less of these nutrients in your daily diet.</p>	Amount	% Daily Value	Teneur	% valeur quotidienne	Calories / Calories 154	*MED	Fat / Lipides 2.1g	*LOW 4%	Saturated/ saturates 0.4g	*LOW 4%	+ Trans / trans 0g		Cholesterol/ Cholesterol 5mg		Sodium/Sodium 240mg	*HIGH 16%	Carbohydrate/ Glucides 20g	7%	Fibre 1.75g	4%	Sugars 1.4g		Protein 2.8g		Vit A/Vit A	2%	Vit C/Vit C	0%	Calcium/Calcium	6%	Iron/Fer	6%	<p>Nutrition Facts / Valeur nutritive Per: 7 crackers (30g) /par 7 craquelins (30g)</p> <table border="1"> <tr><th>Amount</th><th>% Daily Value</th></tr> <tr><td>Teneur</td><td>% valeur quotidienne</td></tr> <tr><td>Calories / Calories 145</td><td>*MED</td></tr> <tr><td>Fat / Lipides 2.6g</td><td>*LOW 4%</td></tr> <tr><td>Saturated/ saturates 0.8g</td><td>*LOW 4%</td></tr> <tr><td>+ Trans / trans 0g</td><td></td></tr> <tr><td>Cholesterol/ Cholesterol 4mg</td><td></td></tr> <tr><td>Sodium/Sodium 60mg</td><td>*LOW 4%</td></tr> <tr><td>Carbohydrate/ Glucides 19g</td><td>6%</td></tr> <tr><td>Fibre 1g</td><td>4%</td></tr> <tr><td>Sugars 5g</td><td></td></tr> <tr><td>Protein 2g</td><td></td></tr> <tr><td>Vit A/Vit A</td><td>2%</td></tr> <tr><td>Vit C/Vit C</td><td>0%</td></tr> <tr><td>Calcium/Calcium</td><td>6%</td></tr> <tr><td>Iron/Fer</td><td>6%</td></tr> </table> <p>LOW, MED, HIGH indicate the amount of each nutrient per serving. You may want less of these nutrients in your daily diet.</p>	Amount	% Daily Value	Teneur	% valeur quotidienne	Calories / Calories 145	*MED	Fat / Lipides 2.6g	*LOW 4%	Saturated/ saturates 0.8g	*LOW 4%	+ Trans / trans 0g		Cholesterol/ Cholesterol 4mg		Sodium/Sodium 60mg	*LOW 4%	Carbohydrate/ Glucides 19g	6%	Fibre 1g	4%	Sugars 5g		Protein 2g		Vit A/Vit A	2%	Vit C/Vit C	0%	Calcium/Calcium	6%	Iron/Fer	6%
Amount	% Daily Value																																																																																																																																			
Teneur	% valeur quotidienne																																																																																																																																			
Calories / Calories 100	*LOW																																																																																																																																			
Fat / Lipides 3.5g	*LOW 5%																																																																																																																																			
Saturated/ saturates 1g	*LOW 5%																																																																																																																																			
+ Trans / trans 0g																																																																																																																																				
Cholesterol/ Cholesterol 4mg																																																																																																																																				
Sodium/Sodium 140mg	*MED 9%																																																																																																																																			
Carbohydrate/Glucides 13g	4%																																																																																																																																			
Fibre 1g	4%																																																																																																																																			
Sugars 1g																																																																																																																																				
Protein 3g																																																																																																																																				
Vit A/Vit A	2%																																																																																																																																			
Vit C/Vit C	0%																																																																																																																																			
Calcium/Calcium	6%																																																																																																																																			
Iron/Fer	6%																																																																																																																																			
Amount	% Daily Value																																																																																																																																			
Teneur	% valeur quotidienne																																																																																																																																			
Calories / Calories 145	*MED																																																																																																																																			
Fat / Lipides 2.6g	*LOW 4%																																																																																																																																			
Saturated/ saturates 0.8g	*LOW 4%																																																																																																																																			
+ Trans / trans 0g																																																																																																																																				
Cholesterol/ Cholesterol 4mg																																																																																																																																				
Sodium/Sodium 60mg	*LOW 4%																																																																																																																																			
Carbohydrate/ Glucides 19g	6%																																																																																																																																			
Fibre 1g	4%																																																																																																																																			
Sugars 5g																																																																																																																																				
Protein 2g																																																																																																																																				
Vit A/Vit A	2%																																																																																																																																			
Vit C/Vit C	0%																																																																																																																																			
Calcium/Calcium	6%																																																																																																																																			
Iron/Fer	6%																																																																																																																																			
Amount	% Daily Value																																																																																																																																			
Teneur	% valeur quotidienne																																																																																																																																			
Calories / Calories 154	*MED																																																																																																																																			
Fat / Lipides 2.1g	*LOW 4%																																																																																																																																			
Saturated/ saturates 0.4g	*LOW 4%																																																																																																																																			
+ Trans / trans 0g																																																																																																																																				
Cholesterol/ Cholesterol 5mg																																																																																																																																				
Sodium/Sodium 240mg	*HIGH 16%																																																																																																																																			
Carbohydrate/ Glucides 20g	7%																																																																																																																																			
Fibre 1.75g	4%																																																																																																																																			
Sugars 1.4g																																																																																																																																				
Protein 2.8g																																																																																																																																				
Vit A/Vit A	2%																																																																																																																																			
Vit C/Vit C	0%																																																																																																																																			
Calcium/Calcium	6%																																																																																																																																			
Iron/Fer	6%																																																																																																																																			
Amount	% Daily Value																																																																																																																																			
Teneur	% valeur quotidienne																																																																																																																																			
Calories / Calories 145	*MED																																																																																																																																			
Fat / Lipides 2.6g	*LOW 4%																																																																																																																																			
Saturated/ saturates 0.8g	*LOW 4%																																																																																																																																			
+ Trans / trans 0g																																																																																																																																				
Cholesterol/ Cholesterol 4mg																																																																																																																																				
Sodium/Sodium 60mg	*LOW 4%																																																																																																																																			
Carbohydrate/ Glucides 19g	6%																																																																																																																																			
Fibre 1g	4%																																																																																																																																			
Sugars 5g																																																																																																																																				
Protein 2g																																																																																																																																				
Vit A/Vit A	2%																																																																																																																																			
Vit C/Vit C	0%																																																																																																																																			
Calcium/Calcium	6%																																																																																																																																			
Iron/Fer	6%																																																																																																																																			
%DV + LOW, MED, HIGH Descriptors + Colour	CONDITION #5 - Colour-Coded %DV		CONDITION #6 - Equal Serving Size + Colour-Coded %DV																																																																																																																																	
	<p>Nutrition Facts / Valeur nutritive Per: 19 crackers (20g) /par 19 craquelins (20g)</p> <table border="1"> <tr><th>Amount</th><th>% Daily Value</th></tr> <tr><td>Teneur</td><td>% valeur quotidienne</td></tr> <tr><td>Calories / Calories 100</td><td></td></tr> <tr><td>Fat / Lipides 3.5g</td><td>5%</td></tr> <tr><td>Saturated/ saturates 1g</td><td>5%</td></tr> <tr><td>+ Trans / trans 0g</td><td></td></tr> <tr><td>Cholesterol/ Cholesterol 4mg</td><td></td></tr> <tr><td>Sodium/Sodium 140mg</td><td>9%</td></tr> <tr><td>Carbohydrate/ Glucides 13g</td><td>4%</td></tr> <tr><td>Fibre 1g</td><td>4%</td></tr> <tr><td>Sugars 1g</td><td></td></tr> <tr><td>Protein 3g</td><td></td></tr> <tr><td>Vit A/Vit A</td><td>2%</td></tr> <tr><td>Vit C/Vit C</td><td>0%</td></tr> <tr><td>Calcium/Calcium</td><td>6%</td></tr> <tr><td>Iron/Fer</td><td>6%</td></tr> </table> <p>% DV - LOW MED HIGH LOW, MED, HIGH indicate the amount of each nutrient per serving. You may want less of these nutrients in your daily diet.</p>	Amount	% Daily Value	Teneur	% valeur quotidienne	Calories / Calories 100		Fat / Lipides 3.5g	5%	Saturated/ saturates 1g	5%	+ Trans / trans 0g		Cholesterol/ Cholesterol 4mg		Sodium/Sodium 140mg	9%	Carbohydrate/ Glucides 13g	4%	Fibre 1g	4%	Sugars 1g		Protein 3g		Vit A/Vit A	2%	Vit C/Vit C	0%	Calcium/Calcium	6%	Iron/Fer	6%	<p>Nutrition Facts / Valeur nutritive Per: 7 crackers (30g) /par 7 craquelins (30g)</p> <table border="1"> <tr><th>Amount</th><th>% Daily Value</th></tr> <tr><td>Teneur</td><td>% valeur quotidienne</td></tr> <tr><td>Calories / Calories 145</td><td></td></tr> <tr><td>Fat / Lipides 2.6g</td><td>4%</td></tr> <tr><td>Saturated/ saturates 0.8g</td><td>4%</td></tr> <tr><td>+ Trans / trans 0g</td><td></td></tr> <tr><td>Cholesterol/ Cholesterol 4mg</td><td></td></tr> <tr><td>Sodium/Sodium 60mg</td><td>4%</td></tr> <tr><td>Carbohydrate/ Glucides 19g</td><td>6%</td></tr> <tr><td>Fibre 1g</td><td>4%</td></tr> <tr><td>Sugars 5g</td><td></td></tr> <tr><td>Protein 2g</td><td></td></tr> <tr><td>Vit A/Vit A</td><td>2%</td></tr> <tr><td>Vit C/Vit C</td><td>0%</td></tr> <tr><td>Calcium/Calcium</td><td>6%</td></tr> <tr><td>Iron/Fer</td><td>6%</td></tr> </table> <p>% DV - LOW MED HIGH LOW, MED, HIGH indicate the amount of each nutrient per serving. You may want less of these nutrients in your daily diet.</p>	Amount	% Daily Value	Teneur	% valeur quotidienne	Calories / Calories 145		Fat / Lipides 2.6g	4%	Saturated/ saturates 0.8g	4%	+ Trans / trans 0g		Cholesterol/ Cholesterol 4mg		Sodium/Sodium 60mg	4%	Carbohydrate/ Glucides 19g	6%	Fibre 1g	4%	Sugars 5g		Protein 2g		Vit A/Vit A	2%	Vit C/Vit C	0%	Calcium/Calcium	6%	Iron/Fer	6%	<p>Nutrition Facts / Valeur nutritive Per: 32 crackers (30g)/par 32 craquelins (30g)</p> <table border="1"> <tr><th>Amount</th><th>% Daily Value</th></tr> <tr><td>Teneur</td><td>% valeur quotidienne</td></tr> <tr><td>Calories / Calories 154</td><td></td></tr> <tr><td>Fat / Lipides 2.1g</td><td>4%</td></tr> <tr><td>Saturated/ saturates 0.4g</td><td>4%</td></tr> <tr><td>+ Trans / trans 0g</td><td></td></tr> <tr><td>Cholesterol/ Cholesterol 5mg</td><td></td></tr> <tr><td>Sodium/Sodium 240mg</td><td>16%</td></tr> <tr><td>Carbohydrate/ Glucides 20g</td><td>7%</td></tr> <tr><td>Fibre 1.75g</td><td>4%</td></tr> <tr><td>Sugars 1.4g</td><td></td></tr> <tr><td>Protein 2.8g</td><td></td></tr> <tr><td>Vit A/Vit A</td><td>2%</td></tr> <tr><td>Vit C/Vit C</td><td>0%</td></tr> <tr><td>Calcium/Calcium</td><td>6%</td></tr> <tr><td>Iron/Fer</td><td>6%</td></tr> </table> <p>% DV - LOW MED HIGH LOW, MED, HIGH indicate the amount of each nutrient per serving. You may want less of these nutrients in your daily diet.</p>	Amount	% Daily Value	Teneur	% valeur quotidienne	Calories / Calories 154		Fat / Lipides 2.1g	4%	Saturated/ saturates 0.4g	4%	+ Trans / trans 0g		Cholesterol/ Cholesterol 5mg		Sodium/Sodium 240mg	16%	Carbohydrate/ Glucides 20g	7%	Fibre 1.75g	4%	Sugars 1.4g		Protein 2.8g		Vit A/Vit A	2%	Vit C/Vit C	0%	Calcium/Calcium	6%	Iron/Fer	6%	<p>Nutrition Facts / Valeur nutritive Per: 7 crackers (30g) /par 7 craquelins (30g)</p> <table border="1"> <tr><th>Amount</th><th>% Daily Value</th></tr> <tr><td>Teneur</td><td>% valeur quotidienne</td></tr> <tr><td>Calories / Calories 145</td><td></td></tr> <tr><td>Fat / Lipides 2.6g</td><td>4%</td></tr> <tr><td>Saturated/ saturates 0.8g</td><td>4%</td></tr> <tr><td>+ Trans / trans 0g</td><td></td></tr> <tr><td>Cholesterol/ Cholesterol 4mg</td><td></td></tr> <tr><td>Sodium/Sodium 60mg</td><td>4%</td></tr> <tr><td>Carbohydrate/ Glucides 19g</td><td>6%</td></tr> <tr><td>Fibre 1g</td><td>4%</td></tr> <tr><td>Sugars 5g</td><td></td></tr> <tr><td>Protein 2g</td><td></td></tr> <tr><td>Vit A/Vit A</td><td>2%</td></tr> <tr><td>Vit C/Vit C</td><td>0%</td></tr> <tr><td>Calcium/Calcium</td><td>6%</td></tr> <tr><td>Iron/Fer</td><td>6%</td></tr> </table> <p>% DV - LOW MED HIGH LOW, MED, HIGH indicate the amount of each nutrient per serving. You may want less of these nutrients in your daily diet.</p>	Amount	% Daily Value	Teneur	% valeur quotidienne	Calories / Calories 145		Fat / Lipides 2.6g	4%	Saturated/ saturates 0.8g	4%	+ Trans / trans 0g		Cholesterol/ Cholesterol 4mg		Sodium/Sodium 60mg	4%	Carbohydrate/ Glucides 19g	6%	Fibre 1g	4%	Sugars 5g		Protein 2g		Vit A/Vit A	2%	Vit C/Vit C	0%	Calcium/Calcium	6%	Iron/Fer	6%
Amount	% Daily Value																																																																																																																																			
Teneur	% valeur quotidienne																																																																																																																																			
Calories / Calories 100																																																																																																																																				
Fat / Lipides 3.5g	5%																																																																																																																																			
Saturated/ saturates 1g	5%																																																																																																																																			
+ Trans / trans 0g																																																																																																																																				
Cholesterol/ Cholesterol 4mg																																																																																																																																				
Sodium/Sodium 140mg	9%																																																																																																																																			
Carbohydrate/ Glucides 13g	4%																																																																																																																																			
Fibre 1g	4%																																																																																																																																			
Sugars 1g																																																																																																																																				
Protein 3g																																																																																																																																				
Vit A/Vit A	2%																																																																																																																																			
Vit C/Vit C	0%																																																																																																																																			
Calcium/Calcium	6%																																																																																																																																			
Iron/Fer	6%																																																																																																																																			
Amount	% Daily Value																																																																																																																																			
Teneur	% valeur quotidienne																																																																																																																																			
Calories / Calories 145																																																																																																																																				
Fat / Lipides 2.6g	4%																																																																																																																																			
Saturated/ saturates 0.8g	4%																																																																																																																																			
+ Trans / trans 0g																																																																																																																																				
Cholesterol/ Cholesterol 4mg																																																																																																																																				
Sodium/Sodium 60mg	4%																																																																																																																																			
Carbohydrate/ Glucides 19g	6%																																																																																																																																			
Fibre 1g	4%																																																																																																																																			
Sugars 5g																																																																																																																																				
Protein 2g																																																																																																																																				
Vit A/Vit A	2%																																																																																																																																			
Vit C/Vit C	0%																																																																																																																																			
Calcium/Calcium	6%																																																																																																																																			
Iron/Fer	6%																																																																																																																																			
Amount	% Daily Value																																																																																																																																			
Teneur	% valeur quotidienne																																																																																																																																			
Calories / Calories 154																																																																																																																																				
Fat / Lipides 2.1g	4%																																																																																																																																			
Saturated/ saturates 0.4g	4%																																																																																																																																			
+ Trans / trans 0g																																																																																																																																				
Cholesterol/ Cholesterol 5mg																																																																																																																																				
Sodium/Sodium 240mg	16%																																																																																																																																			
Carbohydrate/ Glucides 20g	7%																																																																																																																																			
Fibre 1.75g	4%																																																																																																																																			
Sugars 1.4g																																																																																																																																				
Protein 2.8g																																																																																																																																				
Vit A/Vit A	2%																																																																																																																																			
Vit C/Vit C	0%																																																																																																																																			
Calcium/Calcium	6%																																																																																																																																			
Iron/Fer	6%																																																																																																																																			
Amount	% Daily Value																																																																																																																																			
Teneur	% valeur quotidienne																																																																																																																																			
Calories / Calories 145																																																																																																																																				
Fat / Lipides 2.6g	4%																																																																																																																																			
Saturated/ saturates 0.8g	4%																																																																																																																																			
+ Trans / trans 0g																																																																																																																																				
Cholesterol/ Cholesterol 4mg																																																																																																																																				
Sodium/Sodium 60mg	4%																																																																																																																																			
Carbohydrate/ Glucides 19g	6%																																																																																																																																			
Fibre 1g	4%																																																																																																																																			
Sugars 5g																																																																																																																																				
Protein 2g																																																																																																																																				
Vit A/Vit A	2%																																																																																																																																			
Vit C/Vit C	0%																																																																																																																																			
Calcium/Calcium	6%																																																																																																																																			
Iron/Fer	6%																																																																																																																																			

smartphones was permitted but not encouraged (2 participants used the calculator functions on their smartphones). After the survey, the researcher interviewed the participants regarding their perceptions of the NfT and which NfT information they found useful (Table 1). All verbalizations were recorded. The behavioural task lasted 45–60 min and the additional interview lasted 15–20 min.

Qualitative analysis

All recordings were transcribed verbatim. Applying a thematic content analysis approach, the analysis started with a thorough reading of all transcripts. Next, open coding, using MAXQDA11 (Berlin, Germany), was applied to generate initial codes within the transcripts. To do this, 1 rater independently coded 3 randomly selected transcripts to identify key words or phrases (e.g., “I can’t do the math”) describing how participants arrived at their responses as they interpreted, defined, compared, and manipulated the serving size and %DV information on NfTs. The 3 transcripts were then read again thoroughly and the key words or phrases were interpreted and converted into themes (e.g., math error); some themes were further condensed into broad categories (e.g., applied interpretational aids). Themes and categories were labelled, defined, and recorded in a codebook. A second rater coded the same 3 transcripts using the codebook to obtain an inter-rater reliability ratio. In instances where rater codes did not agree (15%), the researchers used a consensus process until agreement about the content and final labelling of themes and categories was reached. Once consensus was reached, the initial rater coded the remaining 23 transcripts. Finally, the themes and categories identified for each of the 9 functional items were organized into 9 separate visual summaries of the data using Microsoft Visio (2013). The subsequent interviews were coded separately to provide contextual information as to the ease of use and perceived usefulness of NfT information overall and across the conditions.

Table 1. Interview guide.

1. What nutrition information, if any, is important to you?
2. What does the information provided in the Nutrition Facts table mean to you?
3. What does %Daily Value mean to you?
4. The survey required you to make decisions based on information provided in the Nutrition Facts table, did you find the Nutrition Facts table provided useful?
5. What do you like about the Nutrition Facts table provided?
6. What do you dislike about the Nutrition Facts table provided?
7. What would you change about the Nutrition Facts table provided to make it more useful to you?

RESULTS

Participant characteristics

The sample (n = 26) consisted of 50% males and 50% females. Fifty percent of participants were adolescents (ages 16–18) and 50% were young adults (ages 19–23) with a mean age of 18.7 ± 1.7 years. The majority of participants self-identified as Asian (58%) or White (35%), and 92% were enrolled in school full-time. Although just over one-third of participants (34.6%) shopped for groceries themselves, 57.1% of adolescents and 75.0% of young adults reported grocery shopping at least once per week.

Behavioural task

As shown in Supplementary Table 1¹, several themes and categories emerged from the analysis to describe the thought processes of participants as they responded to the 9 functional survey items. In addition, 9 separate visual representations of the data were created to summarize the findings and the correct and incorrect responses by stimulus condition. A visual representation summarizing the findings for the functional item testing participants’ ability to compare calorie information on NfTs is shown in Supplementary Figure 1¹; the remaining visuals are available upon request.

Interpreting nutrition information on NfTs

When asked to interpret the amount of sodium in Product A, the majority of participants did not refer to %DV information on the NfT to determine whether a product contains a little or a lot of a nutrient per serving. One adolescent female asked, “I don’t know how much sodium I need a day, like the recommended amount from the Canada’s Food Guide?” Instead, most participants directly compared the amount of a nutrient listed on the NfT for Product A relative to Product B and made a relative judgement.

Of those who referred to the %DV on the NfT, the majority subjectively guessed that either 9% DV or 16% DV was a little or a lot of sodium for a serving of crackers. None of the participants mentioned the %DV thresholds for determining if a serving of a product contains a little or a lot of a nutrient. However, almost half of the participants assigned to conditions providing simple descriptors and colour coding for %DV correctly interpreted the amount of sodium in Product A and cited using the descriptors and colours.

...in my opinion, I don’t think 9% is a lot of sodium ... but because it is highlighted in yellow, that does influence my opinion. (adolescent male)

Indeed, several participants viewing NfTs with colour coding described the value of the interpretational information:

The low, medium labels are useful, because that way it saves you from doing a lot of the work. (adolescent male)

Performance on this question was stronger when serving sizes were equal; however, responses may have been confounded by the fact that the sodium level for Product A in

the unequal serving size conditions was “moderate” (9%), yet it was “high” (16%) when serving sizes were equal.

When asked to interpret the %DV information for calcium and saturated fat on the NFt, the participants were more familiar with calcium than saturated fat as many described the health benefits of calcium, “...calcium is important. You need it for your bones and teeth and other stuff”, but were unclear about whether or not saturated fat was a positive or negative nutrient,

...my first instinct would probably like not, just because I think, like fat is not good, but I know that there are good kinds of fat too. So I would put, I don't know. (adolescent female)

Overall, participants generally perceived the %DV information as “the government recommended amount of a nutrient” they should try to consume every day, regardless of whether the nutrient was positive (e.g., calcium) or negative (e.g., saturated fat).

It has been assigned that you need this amount of saturated fat. So if you kind of value living a healthy life, you would want everything 100% of your daily value for saturated fat. (adolescent male)

Defining %DV information on NFts

Overall, participants were able to correctly define %DV. Most defined the %DV as the percentage of a nutrient that should be consumed per day; however, none mentioned using the %DV to determine whether the product contains a little or a lot of a nutrient nor did the participants refer to Health Canada's %DV thresholds for identifying a little ($\leq 5\%$) or a lot ($\geq 15\%$) of a nutrient on the NFt. Participants who could not define %DV either thought that it was the percentage of calories to consume or simply did not have any idea about the meaning of the term.

Almost all participants reported that the %DV can be used to compare foods, and some participants mentioned how serving sizes need to be relatively similar to use the %DV to compare between products. One male participant described how “...they need to match so I can actually compare them. Why a difference in serving size between the 2 ... how do I use %DV across both?”

Comparing nutrition information on NFts

Almost all of the participants (92.3%, $n = 24$) correctly compared and identified the lower sodium product using the NFt, including 100% of those assigned to the equal serving size condition. Among the participants exposed to products with unequal serving sizes and who answered correctly, 42.9% ($n = 6$) consulted serving size and mathematically manipulated NFt information, 28.6% ($n = 4$) described the amount of sodium in Product A relative to Product B, 7.1% ($n = 1$) cited using the simple descriptors for %DVs, and 7.1% ($n = 1$) consulted the %DVs when comparing between products. Participants who did not correctly compare and identify the product with lower sodium directly compared

the household measures of the serving size information listed on the NFt.

As shown in Figure 2, all participants assigned to the NFt conditions with equal serving sizes in the NFts ($n = 12$) correctly identified the product with fewer calories per serving, whereas only 28.6% ($n = 4$) of participants assigned to NFt conditions with unequal serving sizes answered correctly. Incorrect responses were due to mathematical errors, a failure to consult serving size and to consider the differences between serving sizes, and focusing on the household measure without consulting the metric measure listed for serving size. For example, one male participant responded, “Product A, because you can have 19 crackers with 100 calories instead of eating 7 crackers for 145”.

The presence of simple descriptors and/or colours also did not appear to improve participants' ability to compare between products.

Manipulating nutrition information on NFts

The majority of participants (62.5%, $n = 16$) correctly manipulated the NFt information to calculate the number of servings required to achieve the recommended %DV of fibre.

So you would look at the fibre, which is 1 gram, and 1 gram is 4%. So you would just divide a 100% by 4% so I guess 25 servings. (adolescent female)

Incorrect responses were primarily related to either a mathematical error or a lack of understanding that enough information was provided on the label to make the calculation. For example, 1 male participant said, “I don't know, because I don't know how much fibre you need in one day”.

One participant was unable to respond correctly because she was confused about how to calculate the number of crackers per serving,

I would need to eat 175 crackers to get all my fibre needs for one day. But, how would I write the servings ... because it is asking me how many servings of Product B and I am not really sure. (young adult female)

The majority of participants (69.2%, $n = 18$) correctly calculated the %DV for total fat if half a box of the product was consumed by consulting the metric measure of serving size listed on the NFt. Of those who answered incorrectly, the majority either made a mathematical error or perceived the math as too complex, “I am not doing that math right now”.

Perceptions of and preferences for NFts for comparing and choosing foods

When asked about their perceptions of and preferences for NFts, participants varied in their opinions. Several participants suggested improvements for the NFt including increasing the font size used in NFts as well as making changes to support understanding. For example, participants described “highlighting the High/Med/Low helped for comparing crackers”, “designing NFts so no math is required”, “using the same serving size on food”, and “needing less time to see bad stuff and compare

across". Other participants suggested increasing awareness and trust in the NfT through "advertisements on TV".

DISCUSSION

This is the first study in Canada and 1 of the few internationally to explore how young people comprehend and use nutrition information displayed on packaged food products [27–33]. Moreover, to our knowledge, this is the first study to apply a verbal protocol technique to provide an in-depth account of young people's thought processes when using nutrition information on the NfTs.

Overall, the results suggest that equal serving sizes within product categories support young Canadians' comprehension and use of NfTs. All participants assigned to the NfT conditions with equal serving sizes were better able to interpret and compare nutrition information between products. This is likely because the majority of young people in the current study directly compared the absolute values of nutrients on the NfTs without considering the serving size. Previous research has also demonstrated that few adolescents or young adults consult serving size information when reading NfTs [27]. When serving size was considered, participants generally referred to the household measure (i.e., number of crackers) instead of the metric measure of serving size (e.g., 30 g), leading to incorrect interpretations. Health Canada has proposed changing the requirements for food manufacturers to list more consistent metric measures of serving sizes on the NfT across similar foods [34, 35].

Consistent with previous research among adults in Canada, there was confusion about how to interpret or apply %DV information on NfTs [14]. In 2010, Health Canada launched a "Nutrition Facts Education Campaign" to improve understanding of %DVs, with the main message that $\leq 5\%$ DV represents a little of a nutrient and $\geq 15\%$ represents a lot [24]. In the current study, none of the participants mentioned the education campaign and none seemed to be aware of the %DV thresholds. However, providing simple descriptors or colours to interpret %DV information provided support for some participants to correctly identify relative nutrient content. Past research indicates individuals prefer to examine food label information that is simple in context and format [36]. Therefore, including interpretational aids on NfTs may be one approach to support consumers in assimilating nutrition information on a food label, and in turn it may increase the likelihood of making accurate healthful decisions.

There was also confusion when interpreting %DV for "negative" versus "positive" nutrients, which may be related, in part, to a greater familiarity with some nutrients (e.g., calcium), over others (e.g., saturated fat). Young people in our study described the %DV as "the government recommended amount" they should strive to meet each day, regardless of whether the nutrient was negative or positive. Health Canada's proposed changes to the NfT include reorganizing the order of the nutrients such that negative nutrients and their %DVs are listed in the upper part of the NfT and positive

nutrients are listed in the lower part of the table [18]. Further research is required to determine if changing the order of nutrients listed on the NfT is sufficient to support Canadians with identifying negative and positive nutrients, and interpreting %DV information.

Strengths and limitations

A strength of this study is the rich, in-depth information gathered from young people using the verbal protocol methodology. While this information is not representative of all young people in Canada, and may be subject to selection bias given the small sample size and "opt-in" nature of the recruitment strategy, the sample was evenly balanced by gender and age group. Furthermore, the artificial context in which the behavioural task was completed (i.e., laboratory setting and the presence of investigators) likely influenced participants' responses.

RELEVANCE TO PRACTICE

These findings provide evidence on comprehension and use of nutrition information on the current and modified versions of NfTs from a critically important population for which almost no data exist. Results of this study can be used to support the development of evidence-informed regulatory changes to NfT labelling. Consistent with Health Canada's recently proposed changes, these results reinforce the need for equal serving sizes on similar foods. Furthermore, existing confusion surrounding the interpretation and use of NfT information supports calls for improving food literacy among youth in Canada as well as continued nutrition education that targets this age group at federal and local levels [37]. Although simple descriptors and colour coding on NfTs may help some individuals to interpret %DVs, additional research is needed to understand how best to improve comprehension and use of %DV information among young people in Canada.

Financial support: Financial support for this study was provided by the Canadian Foundation for Dietetic Research. Additional support provided by a CIHR PHAC Applied Public Health Chair (Hammond).

Conflicts of interest: The authors have no conflicts of interest to declare.

References

1. Garriguet D. Canadians' eating habits. Health Rep. 2007 [cited 2015 Aug 24];18(2):17–32. PMID: 17578013. Available from: <http://publications.gc.ca/Collection/Statcan/82-620-M/82-620-MIE2006002.pdf>.
2. Health Canada. Do Canadian adults meet their nutrient requirements through food intake alone? Ottawa: Health Canada; 2012. Report No.: H164-112/3-2012E-PDF [cited 2015 Aug 25]. Available from: http://www.hc-sc.gc.ca/fn-an/alt_formats/pdf/surveill/nutrition/commun/art-nutr-adult-eng.pdf.
3. Health Canada. Do Canadian adolescents meet their nutrient requirements through food intake alone? Ottawa: Health Canada; 2012. Report No.: H164-112/2-2012E-PDF [cited 2015 Aug 25]. Available from: http://www.hc-sc.gc.ca/fn-an/alt_formats/pdf/surveill/nutrition/commun/art-nutr-adol-eng.pdf.
4. Public Health Agency of Canada. Chief public health officer's report on the state of public health in Canada. Ottawa: Government of Canada; 2011. Report No.: Cat.: HP2-10/2011E-PDF [cited 2015 Aug 24].

- Available from: <http://www.phac-aspc.gc.ca/cphorsphc-respcacsp/2011/cphorsphc-respcacsp-06-eng.php>.
5. Shields M. Overweight Canadian children and adolescents. Nutrition: findings from the Canadian Community Health Survey. *Health Rep.* 2006 [cited 2014 Aug 24]; 17(3):27. Available from: <http://www.statcan.gc.ca/pub/82-003-x/2005003/article/9277-eng.pdf>.
 6. Public Health Agency of Canada. Obesity in Canada. A joint report from the Public Health Agency of Canada and the Canadian Institute for Health Information. Ottawa: Government of Canada; 2011 [cited 2014 Aug 24]. Available from: <http://www.phac-aspc.gc.ca/hp-ps/hl-mvs/oic-oac/assets/pdf/oic-oac-eng.pdf>.
 7. Nelson MC, Story M, Larson NI, Neumark-Sztainer D, Lytle LA. Emerging adulthood and college-aged youth: an overlooked age for weight-related behavior change. *Obesity (Silver Spring)*. 2008;16(10):2205–11. PMID: 18719665. doi: 10.1038/oby.2008.365.
 8. Dunn JE, Liu K, Greenland P, Hilner JE, Jacobs DR Jr. Seven-year tracking of dietary factors in young adults: the CARDIA study. *Am J Prev Med.* 2000;18(1):38–45. PMID: 10808981. doi: 10.1016/S0749-3797(99)00114-2.
 9. Alberga A, Sigal R, Goldfield G, Prud'Homme D, Kenny G. Overweight and obese teenagers: why is adolescence a critical period? *Pediatr Obes.* 2012; 7(4):261–73. PMID: 22461384. doi: 10.1111/j.2047-6310.2011.00046.x.
 10. Healthy Kids Panel. No time to wait: the healthy kids Strategy. Ontario: Queen's Printer for Ontario; 2013 February 2013. Report No.: Catalogue No. 017308 ISBN: 978-1-4606-1014-5 (PDF).
 11. Novak NL, Brownell KD. Role of policy and government in the obesity epidemic. *Circulation.* 2012;126(19):2345–52. PMID: 23129701. doi: 10.1161/CIRCULATIONAHA.111.037929.
 12. Health Canada. Regulations amending the food and drug regulations (Nutrition labelling, nutrient content claims and health claims). *Canada Gazette, Part 2.* 2003;137(1):154. Ottawa, ON [cited 2014 Aug 24]. Available from: <http://publications.gc.ca/archives/p2/2003/2003-01-01/pdf/g2-13701.pdf>.
 13. Goodman S, Hammond D, Pillo-Blocka F, Glanville T, Jenkins R. Use of nutritional information in Canada: national trends between 2004–2008. *J Nutr Educ Behav.* 2011;43:356–65. PMID: 21906548. doi: 10.1016/j.jneb.2011.02.008.
 14. The Strategic Counsel. Canadians' understanding and use of the nutrition facts table: Survey results, 2012;POR 088-11(HCPOR-11-01).
 15. Campos S, Doxey J, Hammond D. Nutrition labels on pre-packaged foods: a systematic review. *Public Health Nutr.* 2011;14(8):1496–506. PMID: 21241532. doi: 10.1017/S1368980010003290.
 16. Cowburn G, Stockley L. Consumer understanding and use of nutrition labelling: a systematic review. *Public Health Nutr.* 2005;8(1):21–8. PMID: 15705241. doi: 10.1079/PHN2004666.
 17. Levy L, Patterson RE, Kristal AR, Li SS. How well do consumers understand percentage daily value on food labels? *Am J Health Promot.* 2000;14(3):157–60. PMID: 10787767. doi: 10.4278/0890-1171-14.3.157.
 18. Health Canada. Health Canada's proposed changes to the format requirements for the display of nutrition and other information on food labels. Ottawa: Health Canada; 2014 [cited 2015 Aug 24]. Available from: <http://www.hc-sc.gc.ca/fn-an/consult/2014-format-requirements-exigences=presentation/document-consultation-eng.php#a1>.
 19. Ericsson K, Simon H. Protocol analysis: verbal reports as data. Cambridge, MA: MIT Press; 1984.
 20. Robinson S, Mendelson A. A qualitative experiment: research on mediated meaning construction using a hybrid approach. *J Mixed Methods Res.* 2012;6(4):332–47. doi: 10.1177/1558689812444789.
 21. Health Canada. Regulations amending the food and drug regulations (Nutrition labelling, nutrient content claims and health claims) *Canada Gazette Part II*, Vol 137, No. 1 SOR/2003-11. Ottawa, ON: Health Canada; 2002 Dec 12 [cited 2015 Aug 24]. Available from: <http://publications.gc.ca/gazette/archives/p2/2003/2003-01-01/pdf/g2-13701.pdf>.
 22. Balasubramanian SK, Cole C. Consumers' search and use of nutrition information: The challenge and promise of the nutrition labeling and education act. *J Marketing.* 2002;66(3):112. doi: 10.1509/jmkg.66.3.112.18502.
 23. Wartella EA, Lichtenstein AH, Boon CS. Front-of-package nutrition rating systems and symbols. Phase 1 report. Institute of Medicine (IOM). Washington, DC: The National Academies Press; 2010 [cited 2015 Aug 24]. Available from: http://www.nap.edu/openbook.php?record_id=12957.
 24. Health Canada. Food labels: the percent daily value (%DV). Ottawa, ON: Health Canada; 2015 [cited 2015 Aug 24]. Available from: <http://www.healthycanadians.gc.ca/eating-nutrition/label-etiquetage/daily-value-valeur-quotidienne-eng.php>.
 25. Institute of Medicine (IOM). Dietary reference intakes: water, potassium, sodium, chloride, and sulfate. Washington, DC: The National Academies Press; 2004.
 26. Mackison D, Wrieden W, Anderson A. Validity and reliability testing developed to assess consumers' use, understanding, and perceptions of food labels. *Eur J Clin Nutr.* 2010;64(2):210–7. PMID: 19904290. doi: 10.1038/ejcn.2009.126.
 27. Wojcicki JM, Heyman MB. Adolescent nutritional awareness and use of food labels: results from the national nutrition health and examination survey. *BMC Pediatr.* 2012 May 28;12:55. PMID: 22639924. doi: 10.1186/1471-2431-12-55.
 28. Hawthorne KM, Moreland K, Griffin IJ, Abrams SA. An educational program enhances food label understanding of young adolescents. *J Am Diet Assoc.* 2006 Jun;106(6):913–6. PMID: 16720132. doi: 10.1016/j.jada.2006.03.004.
 29. Anderson SL, Marietta AB, Welshimer KJ. Knowledge, attitudes, and behaviors of college students regarding the 1990 nutrition labeling education act food labels. *J Am Diet Assoc.* 1999;99(4):445–9. PMID: 10207397. doi: 10.1016/S0002-8223(99)00108-X.
 30. Misra R. Knowledge, attitudes, and label use among college students. *J Am Diet Assoc.* 2007;107(12):2130–4. PMID: 18060900. doi: 10.1016/j.jada.2007.09.001.
 31. Huang TTK, Kaur H, McCarter KS, Nazir N, Choi WS, Ahluwalia JS. Reading nutrition labels and fat consumption in adolescents. *J Adolesc Health.* 2004;35:399–401. PMID: 15488434. doi: 10.1016/j.jadohealth.2004.02.005.
 32. Wahlich C, Gardner B, McGowan L. How, when and why do young women use nutrition information on food labels? A qualitative analysis. *Psychol Health.* 2013;28(2):202–16. PMID: 22924452. doi: 10.1080/08870446.2012.716439.
 33. McCullum C, Achterberg CL. Food shopping and label use behavior among high school-aged adolescents. *Adolescence.* 1997;32(125):181–97. PMID: 9105500.
 34. Health Canada. Consulting Canadians to modernize and improve food labels. Ottawa, ON: Government of Canada; 2014. Report No.: Cat: H164-181/2014E-PDF.
 35. Health Canada. Improving nutrition information on food labels: Health Canada's proposed new serving size guidelines to make comparing foods easier. Ottawa, ON: Health Canada; 2014 [cited 2014 August 6]. Available from: <http://www.hc-sc.gc.ca/fn-an/consult/2014-serving-size-portion-indiquee-fs-fr-eng.php>.
 36. van Herpen E, Trijp HC. Front-of-pack nutrition labels: their effect on attention and choices when consumers have varying goals and time constraints. *Appetite.* 2011;57(1):148–60. PMID: 21554909. doi: 10.1016/j.appet.2011.04.011.
 37. Desjardins E, Azevedo E. Food literacy among youth, young pregnant women, and young parents who are at risk for poor health: technical report; 2013 [cited 2014 September 17]. Available from: <http://www.osnp-ph.on.ca/resources/Food%20Literacy%20Study.LDCPOntario.Final.Dec2013.pdf>.