You Shop with your Eyes First: Using the Feature-Positive Effect to Modify Existing Shelf Labelling Systems and Help Consumers make Healthy Choices

by

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ABSTRACT

YOU SHOP WITH YOUR EYES FIRST: USING THE FEATURE-POSITIVE EFFECT TO MODIFY EXISTING SHELF LABELLING SYSTEMS AND HELP CONSUMERS MAKE HEALTHY CHOICES

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With increasing obesity rates, front of package (FOP) nutrition labelling, has been getting interest as a method to nudge consumers towards healthier choices. This study used consumer behaviour theories along with recommendations from previous studies to try to improve the effectiveness of FOP labelling systems on the healthfulness of consumer choices. A proposed labelling system was devised that added a cue so the FOP system was noticeable on all products. This was meant to reduce the chance of consumers overlooking the fact that the FOP system is not referenced on unhealthy food labels. Subjects completed an online grocery shopping task and short survey. Results did not support the effectiveness of the proposed system, but showed there may be some situational use for it. More data is needed from a wider sample group, with more product selection before any definitive recommendations are made.
DEDICATION

For KJ.
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1. Introduction

The obesity epidemic in North America, Europe and several other developed countries has caused a flood of research in the areas of nutrition labelling on food products and consumer eating habits (Cowburn & Stockley, 2005; Watson et al., 2014). In 2015 it was reported that 68.8% of Americans were overweight (Talati et al., 2017). The impact that rising obesity rates could have on citizens and governments of affluent countries was reported as early as 1974, but despite many efforts to educate consumers obesity rates have continued to rise (Cowburn & Stockley, 2005). In an effort to help their population make healthy food choices, several nations have begun looking to use front-of-package (FOP) nutrition labelling to educate and aid consumers in making healthy food purchases (Gamburzew et al., 2016; Kessler, 2016; Koenigstorfer, Wąsowicz-Kiryło, Styśko-Kunkowska, & Groeppel-Klein, 2014). The United Kingdom and Australia have already taken steps towards this with voluntary labelling currently in effect and ongoing talks about making it mandatory (Kessler, 2016; Mathios, 2000; Muller & Prevost, 2016). In the USA, the Institute of Medicine has studied the potential uses of FOP labelling and concluded that their use could help the population make healthier choices and decrease the obesity rate (Watson et al., 2014). Beyond just treating obesity, nutrition labelling is needed to help guide people get all the necessary nutrients they need to avoid several other non-communicable diseases. These diseases are on the rise worldwide, especially in developed countries, and a major cause of this is unhealthy diets (Smith, Stephenson, Dombrow & MacQuarrie, 2002). Nutrition labelling is a population-based approach, which will help alleviate the growth of this problem on a large scale (Smith et al., 2002).
In the media, there is substantial talk about food labelling involving the government mandating producers to include specific information on their products. Producers have pushed back against this notion as including more information could affect their sales and decrease space for creative and branding on their packaging. For this reason, it is very important to look at how other members of the supply chain are able to educate consumers. The retailer has a great potential to influence consumers at the point-of-purchase through several methods such as in-store displays, samples, pamphlets and shelf-labels (Sacco, Sumanac & Tarasuk, 2013). Some of these methods, such as shelf-labelling, can be considered a type of FOP label and follow many of the same principles as a logo on a product’s package. Supermarkets are the main place of food purchasing in most developed countries so they have the most potential to be large influencers on consumers diets, but are currently seen as unhealthy environments (Nakamura, Pechey, Suhrcke & Marteau, 2014; Sacco et al., 2013). Across several developed countries there is a very high prevalence of calorie-dense snack foods and soft drinks in almost all grocery stores (Nakamura, et al., 2014). A 2016 review of studies on nutrition interventions at supermarkets found that most high-quality studies targeting the supermarket environment caused a significant improvement in the healthiness of consumer purchases (Sacco et al., 2013). Of the studies reviewed, most used mixed intervention methods, but a common theme that was found was that shelf-labelling was a key component to these interventions and has the most potential to impact consumer choice (Sacco et al., 2013).

In 2006, a shelf labelling system using a 0 to 3 point scale was introduced in Canada and the United States. It rates nutritional quality using an algorithm and gives
food products a rating which is displayed on labels as 1, 2 or 3-star icons. The program has shown limited success in encouraging consumers to eat healthier but is hampered by low customer awareness ratings (Hobin et al., 2017). A study focusing on the launch of this program used a natural experiment that was made possible as the program was introduced in different locations at different times. The study found a slight shift towards consumers picking foods with less sugar and trans fat, and more omega-3 fatty acids and fibre (Hobin et al., 2017).

A study by the US National Academies aimed at finding the best practices in FOP labelling generated several key recommendations, several of which are congruent with the previously mentioned shelf labelling system, but two of which are not (WartellLa, Lichtenstein & Boon, 2010). These recommendations are consistent promotional campaigns and including icons on all food products (Hobin et al., 2017). elaborate Including icons on all products is especially important since in this system up to 52% of products are not eligible for a 1-star rating and therefore there is no mention to the system on 52% of the shelf labels (Hobin et al., 2017). This thesis outlines a study to assess a new system where the labelling system appears on the shelf tag for every food product to increase the salience of the food labelling program and ultimately have a positive impact on consumer choices.
2. Literature Review

2.1. Nutrition Labelling Background

In the USA, the Nutrition Labelling and Education Act (NLEA) came into effect in 1994 which called for mandatory Nutrition Facts Panels (NFP) on all pre-packaged food products (Colson & Grebitus, 2017). Several studies have been done in the USA on the effectiveness of the NLEA. NFPs were found to be effective at helping consumers make healthier decisions when they were comparing similar products, however not when they tried to put a product in the context of their overall diet (Brennan, 2015). Based on the time cost of doing these comparisons though many consumers would not choose to do them (Brennan, 2015). Other studies found an increase in sale, demand, and price of low-fat substitutes and decrease in the sale, demand and price of regular options of products in some categories (Cawley et al., 2015; Colson & Grebitus, 2017). These results seem to be caused by a shift in consumption only by a certain group of consumers, those who are highly motivated to eat healthily, but less knowledgeable about nutrition (Ducrot et al., 2016). This group tends to expend the most effort in their information searches (Ducrot et al., 2016). The NLEA also caused a majority of consumers to become sensitive to nutrients that are seen as negative like fat, sugar and sodium while becoming less sensitive to nutrients that are seen as positive like protein, vitamins and minerals (Ducrot et al., 2016). Some demographics, specifically white women, saw a decrease in body weight and a decrease in the potential to become obese post-NLEA (Foster et al., 2014). Cost-benefit analyses of the implementation of the NLEA showed that the savings from avoided illnesses were greater than the cost to
implement the program for the country as a whole (Dickson & Sawyer, 1990; Foster et al., 2014). Therefore there is potential motivation to further study and implement nutrition labelling not only from a public health perspective but also from an economic perspective. Overall these studies show the success of mandatory food labelling policy on consumer knowledge and purchase behaviour but suggest there is still a need for more research to understand how to influence less involved consumer groups and increase nutrition knowledge so both healthy and unhealthy ingredients are considered.

In the EU and Australia, much of the discussion has shifted to the possibility of using mandatory FOP labels to increase consumer knowledge and combat obesity. The hope is that it will work much the same as the NFP but reach a greater audience since it may be noticed by less health-conscious or motivated consumers as well (Gamburzew et al., 2016). For now, Australia and several EU countries including the UK have adopted voluntary FOP labelling systems, with government-regulated standards (Mojduszka et al., 1999). These programs state that producers must use the pre-approved format to display nutritional information if they wish to provide nutritional information (Mojduszka et al., 1999). A 2011 study found that in the EU 48% of pre-packaged foods used this voluntary system and the UK it was as high as 82% (Mojduszka et al., 1999). In Australia there is a substantial debate about the effectiveness of this voluntary policy and whether or not it should be made mandatory and implemented on more than just pre-packaged food products in stores (Kessler, 2016; Rayner et al, 2013; Wansink & Chandon, 2006).

A similar voluntary FOP program called “Smart Choices” was implemented in the USA in 2009. It was developed and implemented by industry members rather than the
government (1). A study on the effectiveness of this program found only 64% of foods with the “Smart Choices” qualifications could actually be qualified as healthy based on the government’s nutrient profile models (Koenigstorfer et al., 2014). The program received large amounts of negative attention as it was perceived as making consumers believe the food was healthier than it actually was (Koenigstorfer et al., 2014).

The Guiding Stars program had a better reception since the rating system is transparent and available to the public. The algorithm is designed by an independent scientific panel and the program is administered by retailers (Hobin et al., 2017). This program has been shown to improve consumer eating habits by reducing trans fat and sugar purchased and increasing fibre and omega-3 fatty acids (Hobin et al., 2017). The Guiding Stars also led to a higher average price per product purchased, the number of products purchased per transaction and store revenue, despite low recorded awareness values of 8.7% (Hobin et al., 2017). This system is currently being used by some grocery stores in Canada and the USA (Hobin et al., 2017). Consumers in Canada are generally open to new FOP labelling techniques to supplement the NFP so long as they are uniform and government-mandated, unlike the voluntary systems in Australia and the EU (Williams, 2005).

2.2. Types of FOP Labels

Though several countries realize the necessity for better nutrition labelling on food products and the potential for FOP labelling to do that, there is still wide debate about which method of FOP labelling would be the best. The main types of labels that are being proposed are Traffic Lights (TL), Guideline Daily Amount (GDA) and Single
Summary Indicators (SSI) (Hodgkins et al., 2012; Hodgkins et al., 2015). TL labels use colour coding to indicate a low (green), moderate (yellow) or high (red) level of a nutrient that is generally seen as unhealthy (Hodgkins et al., 2015). Alternatively, TL labels could be used to signify high levels of generally positive nutrients by using green to represent high in these cases and red to mean low. GDA labels use a percentage of the daily recommended amount of a specific nutrient to show a consumer how much is in a serving of that product (Hodgkins et al., 2015). SSI labels use logos such as the Health Check or Guiding Stars to indicate if a product meets certain nutritional standards set by independent 3rd parties (Hodgkins et al., 2015).

Several studies have been done on which type or combination of types of FOP labelling would be most effective and while there is no consensus, there are clear themes that emerge such as the combination of objective and evaluative cues on the same label (Newman, Howlett & Burton, 2015). Objective cues such as GDA include facts about the product and evaluative cues such as TL or SSI give consumers a way to judge overall healthfulness of the product without which they will struggle to make comparisons between products (Newman et al., 2015; Roodenburg, Popkin & Seidell, 2011). Consumers find evaluative cues easier to use, especially SSI, and are more motivated to use them, however many studies show a combination of these cues can be more effective than either one alone at improving nutrition knowledge, and ability to select healthy food options (Kim, House, Rampersaud & Gao, 2019; Mojduszka et al., 1999; Tarabella & Voinea, 2013). One study also says both SSI and TL labels should be included to create the most effective label (Mathios, 2000). One of the main recommendations for best practices in FOP labelling from the US National Academies is
to use evaluative cues (Wartella et al., 2010). The star icon system that this study is modelled after is an example of an evaluative SSI program (Hobin et al., 2017).

SSI labels are more difficult to understand for consumers because they are based on criteria they may not be familiar with, however, SSI labels still increase the perception of product healthiness compared to TL and GDA labels (Gamburzew et al., 2016; Kim et al., 2019). Some SSI labels on food products, such as the USA’s Smart Choices program, do not single-handedly impact consumer purchase behaviour but do increase consumer knowledge (Machin et al, 2017). When in conjunction with other FOP labels such as TL, they have been found to change purchasing behaviour (Mathios, 2000). Another of the key recommendations from the US National Academies is to have a transparent FOP labelling system, such as the Guiding Stars, where the criteria for what is considered healthy are publicly available (Wartella et al., 2010).

2.3. Shelf Labels

A 2012 review of FOP labelling said SSI shelf labels held the most promise as an FOP method to influence consumer habits (Lewbel, Arthur & Pendakur, 2013). Another review in 2016 of grocery store interventions found that most point-of-purchase interventions were effective, and though it was difficult to determine which part of the interventions were best, shelf labelling was the most promising method with 14 out of 17 reviewed studies showed positive results (Sacco et al., 2013). Interest in shelf labels specifically has been noted in literature since 1985 when a study was done on the USA special diet alert program which was an intervention that included in part shelf-labelling in supermarkets (Andrews, Burton & Kees, 2011). It found there was an overall increase
of 8-12% sales for labelled products vs non-labelled ones (Andrews et al., 2011). A similar study flagged specific positive nutrients in a shelf label and found a 12% increase in market share for labelled products (Arrúa et al., 2017). Other nutrition information programs that use shelf labels produced overall healthy purchasing behaviour from consumers (Balasubramanian & Cole, 2002). Consumers use shelf labels to compare between products in the same category and they can cause them to make healthier choices as long as substitution costs aren’t too high (Blitzstein & Evans, 2006). While not as frequently used as other FOP labels, shelf labels are still found to be very helpful by consumers, especially those who are more health-conscious (Lewbel et al., 2013).

The health star systems tested in Australia ranked higher in consumer preference than any other type of FOP label (Wansink & Chandon, 2006). The system was found effective in helping consumers distinguish between healthy and unhealthy options in the same product category (Wartella et al., 2010). This is likely because of the speed and ease of use of the SSI logos (Wansink & Chandon, 2006; Wartella et al., 2010). Field studies show that these systems work. In one trial, the star system significantly decreased purchases of products with no stars and increased purchases of products with stars immediately and up to 2 years post-implementation (Kiesel & Villas-Boas, 2013). A similar Nutrition scoring system called NuVal also showed positive results by increasing consumers choices of healthy products, decreasing price sensitivity and increasing promotion sensitivity (Roe, Levy & Derby, 1999). Another field study reported an average 4-8% total sales increase in affected categories after implementing shelf labelling in some stores (Lewbel et al., 2013). Signposting caused unhealthy product
purchases to drop in 2 different grocery store chains in the USA (Gamburzew et al., 2016). Shelf labelling has also been found to be particularly effective for minorities, low-income groups and middle-aged women (Lewbel et al., 2013; Talati et al., 2016).

There is a potential issue of shelf labels decreasing store overall sales because the increase in sales of healthy food can not offset the decrease in sales of unhealthy products (Pettigrew et al., 2017). When tested in a recent study, a shelf labelling program was found to increase store revenue since consumers were willing to pay more for products that were rated healthier and bought more products each trip to the store (Hobin et al., 2017).

Studies on which method of FOP labelling consumers prefer show similar findings, but no studies show that what consumers prefer is actually the most effectively understood (Hodgkins et al., 2012). Generally, consumers find FOP labels to be more appealing than NFPs (Mojduszka, Caswell & Harris, 2000). Specifically for FOP labels consumers prefer labels that are simple, consistent across all products and government regulated (Gamburzew et al., 2016; Graham, Lucas-Thompson, Mueller & Harnack, 2017; Hamlin & McNeill, 2016; Zafar, Hashim & Halim, 2016). Others found consumers preferred SSI labels for their ease of use (Lewbel et al., 2013). A review summarized these mixed findings and concluded SSI labels are harder to understand because there are no clear guidelines of what warrants a product being given the label, but they still increase consumer perception of healthiness more than a TL and GDA label (Gamburzew et al., 2016). Consumers also prefer shelf labels because they are the most helpful to them, but they tend to use them the least in practice (Lewbel et al., 2013).
2.4. Use of FOP Labels

Consumer use of FOP labels depends on both their knowledge of nutrition information and their motivation to use it (Tarabella & Voinea, 2013). These factors change significantly between different demographics and attention to nutrition labels is correlated with a healthy overall diet (Talati et al., 2016a). Several studies have identified various factors that influence the likelihood of a person using nutrition labels and they have found a person is most likely to use NFP or FOP labels if they are: overweight, more educated, a woman, over 30 year old, a parent with young children (especially if the child is overweight), diagnosed with a preexisting medical condition, not currently a student, highly nutrition-conscious, following specific fitness goals, very knowledgable about nutrition, trying to lose weight (regardless of current BMI), or buying a product for the first time (Gamburzew et al., 2016; Graham, Orquin & Visschers, 2012; Grunert & Wills, 2017; Hodgkins et al., 2012; Kim et al., 2019; Lewbel et al., 2013; Seigrist, Leins-Hess & Keller, 2015; Thorton et al., 2013; Variyam & Cawley, 2006). Other studies have found that FOP labelling is equally effective as an intervention across all socio-demographic categories and education levels (Koen, Blaauw & Wentzel-Viljoen, 2016; Newman, Howlett & Burton, 2014; Sacks, Rayner & Swinburn, 2009).

One demographic group of particular concern is children. A study found parents shopping for children selected much healthier food when TL labels were present and even more often when there was in-aisle signage to explain how to use the labels (Binnie & Pasut, 2013). Another study found using warning labels on foods high in nutrients that are perceived as negative was more effective in children than other
common FOP labels such as TL and GDA (Temple & Fraser, 2014). More research is called for in this area since children are at risk of obesity, but typically do not have the ability to shop for themselves and if they did they lack the understanding of nutrition required to make healthy choices with the existing NFPs (Temple & Fraser, 2014). Some demographic groups such as the elderly and ethnic minorities have trouble understanding nutrition facts at all (Hodgkins et al., 2012).

2.5. Consumer Knowledge

Consumer knowledge is a main factor in the use of nutrition information found on food labels, but several studies have made it clear that many consumers in Canada and the USA lack the understanding required to use existing food labels effectively (Muller & Prevost, 2016; Sanjari, Jahn, & Boztug, 2017). A 2005 review article highlighted an issue with several nutrition labelling experiments because participants self-reported use of food labelling was much higher than their actual observed use (Edge, Toner, Kapsak & Geiger, 2014; Hodgkins et al., 2012). When participants did use the nutrition labels, they understand simple values and words but struggle to use the provided information to make complex decisions such as comparing two similar products (Edge et al., 2014). This is largely because consumers struggle to understand how to use serving sizes and recommended daily amounts and tend to revert to judging the healthfulness of an entire product based on one key nutrient they are looking for, usually total calories or fat (Edge et al., 2014; Gabaix & Laibson, 2006). People also tend to look at small differences in calories rather than large differences in all other nutrients (Talati et al., 2016a). Since 1996, people’s attention to every nutrient has decreased except for total calories and
fibre (Hamlin & McNeill, 2016). Consumers may have trouble with guideline daily amounts (GDA) because, though they understand the notion of calories they may not be able to apply it to themselves in the context of their lifestyle and total diet (Graham et al., 2017). One study argues that consumers misinterpret FOP labels, especially SSI because they process them just like other cues on the package and not as separate information sources (Scrinis & Parker, 2016). It also stated that based on verbal protocol consumers who look at labels may not be reading or understanding the information in the first place (Edge et al., 2014). Consumers also tend to have certain products they perceive to be healthy (even if they are not) so they ignore nutrition facts on them (Gamburzew et al., 2016). This is particularly concerning in categories such as yogurt and granola bars which are perceived to be healthy but can actually contain significant amounts of sugar and fat (Gamburzew et al., 2016). Consumers may also perceive a product labelled as low-fat to be healthy and not continue their information search to the NFP to see if it is actually healthier or if the fat has been replaced with a substitute such as sugar (Geyskens, Pandelaere, Dewitte & Warlop, 2007).

If consumers understood labels better they may be more likely to use. This is demonstrated in a study which found are more likely to use FOP labels when there is signage available to explain it (Roberto et al., 2012a; Binnie & Pasut, 2013). The problem arises when the consumer does not know that they don’t understand labels. In one study, subjects claimed they perfectly understood nutrition labelling but also claimed labels need improvement (Gamburzew et al., 2016). This means sometimes even with FOP labels consumers can misinterpret them so actual purchase patterns may not change unless labels are clearly understood, or they could make a change but
not to another product that is any healthier (Mojduszka et al., 2000). The use of multiple different FOP labelling systems has been shown to confuse consumers in this way (Mojduszka et al., 1999).

Consumers also show confusion when attempting to interpret a 0 rating in an ordinal nutritional labelling system. In a study using a 3-star labelling system, consumers were asked to identify why a product might not have a star on the shelf tag and 47% of them could not correctly identify at least one reason (Hobin et al., 2017). There are four possible correct answers as to why a product would not have a star icon on the tag which are: It does not meet the minimum nutritional requirements for 1 star it is a new product that is not yet rated, it is not a food product and therefore not eligible to be rated, or it has less than 5 Kcal/serving (Hobin et al., 2017).

2.6. Effects of FOP Labels

All types of FOP labels seem to have potential to increase consumer nutrition knowledge (Lobstein, Landon & Lincoln, 2007; Machín et al, 2017; Magnusson, 2010; Roberto et al., 2012b). These labels are most useful when displayed on the top left of a package compared to anywhere else on the package or shelf (Lewbel et al., 2013). Research also shows that when viewing products in isolation all FOP labels will increase consumer perception of the product (Newman et al., 2015). FOP labels can also decrease perceived healthiness of junk food such as cookies, sugary drinks and ultra-processed foods (Levy, Mathews, Stephenson & Tenny, 1985; Li & Kannan, 2014; Variyam & Cawley, 200;). FOP labels can also be used along with health claims to increase consumer information search (Malam et al., 2009). Generally, simpler FOP
labels are quicker to process which makes them much more effective since consumers only spend on average 4 to 10 seconds looking at the product before making a purchase decision in a supermarket context (Hamlin & McNeill, 2016; Roberto et al., 2012c; Sutherland, Kaley & Fischer, 2010; Talati et al., 2017).

More concise FOP labels with fewer words and less information can lead to more positive evaluations of the products, though simpler products such as salad dressing benefit less from these labels compared to complex products such as full frozen meals (Dunford et al., 2017; Gamburzew et al., 2016; Newman, et al., 2014). Consumers like FOP labels because they think they will help them make healthier choices (Mojduszka et al., 2000). Therefore by putting shelf-labels on products, supermarkets are able to increase consumer perception of the store (Newman et al., 2015).

One downside of FOP labels that has been noted is a positivity bias that can arise when people see an unhealthy product they would not have otherwise bought is actually not as unhealthy as they may have thought based on one specific nutrient so they could end up buying it when they otherwise would have dismissed it before checking the nutrition facts (Talati et al., 2016b; Li & Kannan, 2014). This effect happens with TL and GDA labels, but not with SSI or nutrition claims and only impacts consumers who would not read the NFP and have a low understanding of nutrition information (Talati et al., 2016b). FOP labels can also cause a “Halo effect” that causes consumers to truncate their information search after reading the front of the package because they have already been convinced a product is healthy just by looking at one fact (Emrich, Qi, Lou & L'Abbe, 2017). However, this is not an issue for SSI labels such
as health checks that take into account the overall healthiness of the product (Emrich et al., 2017).
3. Conceptual Development

3.1. Theoretical Framework

One consumer behaviour theory that will be discussed in this research is the Feature Positive Effect, often summed up as “Out of Sight, Out of Mind”. This theory states that consumers who are making a purchase decision based on limited information often overlook the features that are not mentioned and make their decision only using the features displayed in front of them (Kardes, Sanbonmatsu & Herr, 1990). An example would be a consumer in a grocery store who only has access to the information displayed on the package. Time constraints and limited cognitive resources often lead to these consumers only considering the front of the package and the shelf tag, not using the NFP on the back (Blitzstein & Evans, 2006; Mojuszka et al., 1999).

In this case, a consumer would tend to make their purchase decision only based on the few attributes displayed on the front of the package, not realizing they are omitting important nutrition information that could be found on the back (Kardes et al., 1990). This effect can be demonstrated in several other fields as well, including discrimination learning in humans and other animals, hypothesis testing, covariation judgement (Kardes et al., 1990). One study suggests that humans with a high degree of knowledge and experience on a subject are less likely to overlook the non-non-occurrence of information (Kardes et al., 1990). In the context of nutrition labelling, this could mean that consumers with extensive nutrition knowledge could be less likely to overlook missing nutrition information.
The Dichotic Theory of Salience will also be referenced in this paper. This theory states that a stimulus can be made salient in one of two ways. The first is called In-Salience which describes a situation where the stimulus is incongruent with its environment, causing it to stand out and become more salient in the viewer's mind (Guido, 1998). This is known as a bottom-up processing method because it involves the viewer collecting inputs and sorting them, then singling out the cue that does not fit with the others (Guido, 1998). The second method is called re-salience which refers to a stimulus being relevant to the viewer’s pre-existing schema and being made salient through internally motivated, top-down processing (Guido, 1998). This has become important when discussing FOP labels to know exactly how the label is becoming salient in the consumer's mind since top-down and bottom-up processing have different motivations (Guido, 1998).

The US National Academies have made several recommendations for how an effective FOP labelling system should operate, some of which have been implemented by existing programs, and some of which have not (Wartella et al., 2010). These include: being simple and easy to use, incorporating an ordinal scale, having a transparent process of translating nutrition information into rankings, being consistent with and complimenting the NFP, having a frequent advertising campaign, and appearing on all food products in the store (Wartella et al., 2010). When looking at the three-tiered star icon shelf labelling system which is currently popular in Canada and the USA it is clear that two of the US National Academics recommendations are not in line with the current program. Firstly the program in question has no consistent promotional campaigns, which could contribute to the very low consumer awareness ratings that
have been reported (Hobin et al., 2017). The second recommendation that is not in line with the current program is that currently the program is not referenced on labels that do not receive at least a 1-star rating. This can be up to 52% of products in an entire grocery store, and as high as 80% of some categories (Hobin et al., 2017). For consumers that are aware of the program, the lack of cues may decrease the chance that the knowledge is prominent in the consumer’s mind which would decrease the likelihood of it impacting their purchase decision. The feature-positive effect explains that a consumer is likely to overlook the missing information, even if they are aware it should be there (Kardes et al., 1990). This concept holds true in several other contexts besides just retail shopping such as concept identification, discrimination learning, self-perception, false consensus, hypothesis testing, covariation assessment, problem-solving (Kardes et al., 1990). Those with some expertise using a product are less likely to overlook missing information (Kardes et al., 1990).

This study uses a cue relating to the existing shelf labelling system on all product packages to see if consumers will notice it on a product that has no stars, be reminded of the system, realize the product has been rated as unhealthy and consider purchasing a substitute product with a higher nutritional value. This test relies on the dichotic theory of salience which suggests that the cue will make the concept of the shelf-labelling system re-salient because it is congruent with the context, meaning it’s something they should expect to see in that situation (Guido, 1998). Re-salience primes the consumer to use top-down processing methods which are more goal-oriented (Guido, 1998). Since health goals are a strong contributing factor in how effective FOP labels are, this salience nudge should cause the consumer to consider using the shelf tags to make a
healthier purchase decision (Onozaka, Melbye & Hansen, 2014; Papies, Potjes, Keesman, Schwinghammer & Van Koningsbruggen, 2014; Wilson, Buckley, Buckley & Bogomolova, 2016)

Under the current system when a product is rated 0 stars there is nothing on the shelf tag to indicate it is part of the rating system at all. Under the proposed system a small box around the space on a 0-star label still reminds the consumer about the program and shows that the product has not been excluded.

Figure 1 is the theoretical framework of the decision process for a consumer evaluating a product that is not rated as healthy and has no cues relating to the shelf labelling system on the label. It shows how a consumer might decide to purchase an unhealthy product or change their purchase decision based on an existing FOP shelf
labelling system. The first important information to note is that the consumer must be aware of the shelf labelling system for it to have an impact on the purchase decision since there is no evidence of accidental exposure to FOP labelling being effective. Current awareness of the shelf labelling system used in major Canadian retailers has been reported as only 8.7% six months after the program was implemented, but similar programs in Australia have reported as high as 28% awareness (Hawley et al., 2013; Hobin et al., 2017). When an aware consumer sees a product on the shelf that has no reference to the program on the label they may either remember the program and notice the missing icon or they may not remember it. The feature-positive effect would suggest that it is more likely a consumer would overlook the non-occurrence of this information (Kardes et al., 1990). If they overlook the missing information and no memory of the shelf labelling system is triggered then it doesn’t matter if the consumer is aware of the system because it will not be salient to them at the time of their purchase decision. Should the consumer notice the missing information they still need to interpret why it is missing. In this case, there are 3 possibilities. Firstly the consumer thinks the product is unrated which could be true if the product is new or less than 5kcal/serving, or it could be false if the product has been rated as unhealthy so there are no stars or icons on the label. Either way, they are not considering the nutritional quality of the food anymore or less than they would otherwise. The second option is that the consumer does not know why there is no star or icon on the label. In a previous study, it has been found that almost 47% of consumers fit into this category when asked to interpret a shelf label with no stars (Hobin et al., 2017). The third option is that the consumer knows the product has been rated and the lack of a star means the product is unhealthy. This study hopes
to show that with small manipulations to the design of the shelf labels, more consumers will come to this realization and change their purchasing behaviour for the better.

3.2. Research Gap

There is a lack of research on the effectiveness of FOP labels across different product categories. Far more products in some food categories than others meet the criteria for FOP labels such as stars icons. For example, if the criteria to get a star is having more than 5g of fibre and less than 10g of sugar, there will be many more products eligible in the bread aisle than the dairy aisle. Some categories are full of foods with plenty of stars, some categories have very few products with stars and some categories have a wide range of products with very different nutritional values. This is referred to as the heterogeneity of the category (Wartella et al., 2010). In this study, three different categories will be tested with varying levels of heterogeneity to determine if the effectiveness of a change to the FOP labelling system where there is a reference to the system on all food products, just as was recommended by the US National Academies (Wartella et al., 2010).

Previous FOP labelling research uses a physical store location (or laboratory resembling a store) to test the impact of FOP labelling, but with several grocery stores now offering online shopping services this study aims to look at the online environment to see how FOP labelling can be used effectively on a website. This study will also test one of the key recommendations by the US National Academies that is not currently being implemented by the leading shelf labelling system in Canada, which is to include the program on every food product in the store.
3.3. Hypothesis

The primary goal of this study is to test if the proposed shelf labelling system is more effective at influencing consumers to make healthier purchases compared to the existing version. Therefore the main hypothesis is that on average the participants who saw the proposed shelf labelling system will have products eligible for more stars in their basket than those who saw the existing system.

H1: Participants who complete the shopping task while being exposed to the proposed new Star Icon labelling system will have more star icons in their basket compared to participants who completed the same task while being exposed to the current Star Icon labelling system.

The second hypothesis explores the difference in effect between categories. It is hypothesized that the difference between the stars for selected products in one category when comparing the existing and proposed system will be larger in high heterogeneity categories as there are more options available that are eligible for stars so participants with different preferences can find differs products with more stars that they are willing to purchase.

H2: The effect of the proposed labelling system on the number of star icons in a consumers basket will be the greater in the high heterogeneity category compared to the medium and low heterogeneity categories.

The third hypothesis states that after the shopping task, consumer self-reported use of the shelf labelling system will be higher amongst those who were exposed to the proposed system since there are more cues relating to the system throughout the
Shopping environment, especially in low heterogeneity categories since there are fewer products eligible for star icons.

H3: The proportion of participants who report using the star icons when making their purchase decision will be higher if they saw the new proposed version of the labelling system compared to those who were exposed to the existing version.

![Theoretical Framework of Proposed FOP Labelling System](image)

**Figure 2: Theoretical Framework of Proposed FOP Labelling System**

Figure 2 is the theoretical framework of the decision process for a consumer evaluating a product that is not rated as healthy but has cues relating to the system on the label. It shows the hypothesized effects of the proposed changes to how the shelf labels are displayed. The first change will be the decreased likelihood of consumers overlooking the missing information because their attention will be drawn to the spot...
where the star icons should be (Theeuwes & Van der Burg, 2013). The increased attention will trigger re-salience since the known system is congruent with the current context (Bix et al., 2015). Now that the shelf labelling system is salient in a consumers mind, and they can see there is clearly a spot where the icons would go if the product was eligible for any, more consumers will know that the product is unhealthy and there will be less confusion about why no stars are being displayed.
4. Method

4.1 Participants

Participants for this study will be undergraduate students at the University of Guelph. Students will be recruited through the SONA system, which uses a pool comprised of students in several undergraduate marketing classes. Based on this it is likely that most participants will be from the Department of Marketing and Consumer Studies, however, students from other departments are in some of these courses as electives or elements of minor degrees. Students in these courses are able to participate in this study through an online portal to earn 1% course credit. This is a convenience sample, but it is highly relevant in today’s market since the sample will be primarily millennials which are currently the largest consumer segment in the USA (Oz, Unsal & Movassaghi, 2017)

Responses will be excluded if the survey is filled out incorrectly. Due to limitations with the Qualtrics software participants could not be required to only select one option for the specific question type used, therefore if they did not carefully read and follow the instructions then some participants selected multiple responses in a single question, these results could not be used.

4.2 Study Design

This study uses a 3x3 between-subject design. There are 3 groups depending on which versions of the shelf labels they are shown during their shopping task which are: no shelf labels, shelf labels as they exist now under an FOP shelf labelling system, and
the proposed shelf labels with a small box around the area where the stars would be found on all food products. Figure 3 shows an example of how the proposed system looks compared to an existing food labelling system. Left is a representation of how the star icons are currently presented and on the right is how they would be presented under the proposed system.

![Figure 3: Current (Left) and Proposed (Right) Icon Design](image)

The product categories that subject select from will have either a high, medium or low heterogeneity of stars. High heterogeneity will be represented by the dairy category, which has more products eligible for 2 or 3 stars compared to the other categories. The low heterogeneity category will be frozen food and the medium heterogeneity category will be cereals, which will have more products eligible for stars than the frozen food selection of products, but fewer than the dairy group.
4.3 Survey

The survey was designed to be completed in 10-15 minutes. It consisted of a short information package for participants to read, then the product selection task where they chose one product they would buy in each of 3 categories (all with either no star icons, the currently used star icons, or the proposed modified system). This would be followed by a short exit survey consisting of demographic questions and consumer preference questions using a 5-point Likert scale.

4.4 Procedure

Students who wish to participate will be directed to the SONA website and can complete it at a time suitable for them. Participants will first be presented with a brief document to read which explains the research interests and several different types of nutrition labelling systems, including the shelf labelling system that is being studied. This information package will also include a significant amount of information about grocery stores trending towards online food sales which is meant to distract the subject from fixating on the nutrition labelling as the main goal of the experiment. Next, the participant will see a page that resembles a grocery store’s online shop. At this point, participants will have been separated into 1 of 3 groups. Group 1 will see no shelf labelling system in place during the product selection. Group 2 will see a simple shelf labelling system modelled after an existing system in several Canadian grocery stores where products get 1, 2 or 3-star icons depending on their nutritional value, but no icons if they do not meet the minimum threshold for 1 star. The third group will see the same
system as group 2, but with a small box around the area where the star icons are, or should be if the product was not eligible for any stars. They will be asked to select one product they would purchase from each of the 3 different categories (dairy, breakfast cereals, frozen food). Frozen foods will represent high heterogeneity with several options at all different levels from 1 to 3 stars. Dairy will represent medium heterogeneity and breakfast cereals will represent low heterogeneity. Once the participant has selected all of the products they would buy they can proceed to the short exit survey. No directly identifying information will be collected.

4.5 Data Description

In total, the survey recorded 329 responses. Of those, 26 were removed for being incomplete. Out of the remaining 303 responses, only 119 participants correctly followed the instructions, so these were the only results included in the analysis. The data tended to be skewed towards participants selecting products eligible for 0 stars in all three categories, with as high as 67% of participants selecting a 0-star product in the low heterogeneity (Frozen Food) category.
Participant self-reported awareness, understanding, and use of the Star Icons were measured in the exit survey after the shopping task. The breakdown of their responses is listed below in Table 1.

**Figure 4: Frequency of stars on selected items for all categories and scenarios**

![Bar chart showing frequency of stars on selected items for all categories and scenarios](chart.png)

**Table 1: Self Reported Awareness, Use and Comprehension**

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Participants that reported seeing the Star Icons</th>
<th>Participants that claim to understand the meaning of the Star Icons</th>
<th>Participants that claim the Star Icons increased the likelihood they purchase a given product</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - No Labelling</td>
<td>28.6%</td>
<td>9.5%</td>
<td>11.9%</td>
</tr>
<tr>
<td>2 - Current Labelling</td>
<td>55.8%</td>
<td>39.5%</td>
<td>23.3%</td>
</tr>
<tr>
<td>3 - Proposed Labelling</td>
<td>61.8%</td>
<td>41.2%</td>
<td>26.5%</td>
</tr>
</tbody>
</table>
Other important statistics about the sample are that only 3.3% of the participants reported using online shopping to purchase food regularly, and 6.9% of participants had dietary restrictions that could have restricted them from buying some of the products listed (4.3% gluten-free, 1.7% Vegetarian, 0.9% Vegan).

4.6 Variables

The main dependent variable is the number of stars that the products in a consumers basket are eligible for in a given category. The number of stars was measured as count data since it can only be positive integers between zero and three.

Independent control variable to be accounted for include: nutrition knowledge, weight control, personal health goals, gender and age. Nutrition knowledge will represent how much the consumer knows about their dietary needs and how well they can identify the healthfulness of a food product. Weight control refers to the participant's desires to control their diet for the purpose of losing weight. Personal health goals will capture any other dietary or health-related concerns that may cause the participant to take special consideration when grocery shopping. These will all be collected by self-reporting in the exit survey. See table 9 for a summary of variables.
4.7 Model 1 - Poisson

A Poisson assumes equi-dispersion of the mean and variance of the dependent variable.

\[ \sigma^2 = \mu \]

Where \( \sigma^2 \) is the variance and \( \mu \) is the mean of the dependent variable. Below in Table 2 are the mean and variances for each category.

<table>
<thead>
<tr>
<th>Category</th>
<th>Mean</th>
<th>Variance</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairy (High)</td>
<td>1.10</td>
<td>1.55</td>
<td>0.45</td>
</tr>
<tr>
<td>Cereal (Medium)</td>
<td>0.62</td>
<td>0.75</td>
<td>0.13</td>
</tr>
<tr>
<td>Low (Frozen)</td>
<td>0.60</td>
<td>0.85</td>
<td>0.15</td>
</tr>
</tbody>
</table>

To determine the participant’s Nutrition Awareness and Health Goals, Principle Component Analysis were done using several questions from the 5-point Likert Scale in the Exit Survey. For Nutrition Awareness these questions covered how much the participant claimed to use different sources of nutrition information while shopping, and how actively they looked for certain nutrients and ingredients in their food. For Health goals the question asked about their concern for personal health, fitness/training, and weight control. The Principle Component Analysis combines these potentially correlated variables and uses an orthogonal transformation to result in their principle components which are linearly uncorrelated variables. The Nutrition Awareness PCA included questions 11 different questions from matrix tables, and the Health Goals PCA included
three matrix table questions. The full questions used in each can be found in appendix 1.

Table 3: Variable Description for Poisson Analysis

<table>
<thead>
<tr>
<th>Variable</th>
<th>Type</th>
<th>Representation in Model</th>
<th>Expected Sign</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of Stars</strong></td>
<td>Count</td>
<td>Scale of 0-3</td>
<td>N/A (DV)</td>
</tr>
<tr>
<td><strong>Scenario 1</strong></td>
<td>Binary</td>
<td>0 = Not Imposed; 1 = Imposed</td>
<td>$\beta_1 &lt; 0$</td>
</tr>
<tr>
<td><strong>Scenario 2</strong></td>
<td>Binary</td>
<td>0 = Not Imposed; 1 = Imposed</td>
<td>Base</td>
</tr>
<tr>
<td><strong>Scenario 3</strong></td>
<td>Binary</td>
<td>0 = Not Imposed; 1 = Imposed</td>
<td>$\beta_2 &gt; 0$</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td>Binary</td>
<td>Base: Male = 0, Female = 1</td>
<td>$\beta_3 &gt; 0$</td>
</tr>
<tr>
<td><strong>Weight Control</strong></td>
<td>Ordinal</td>
<td>Scale from 1 to 5</td>
<td>$\beta_4 &gt; 0$</td>
</tr>
<tr>
<td><strong>Nutrition Knowledge</strong></td>
<td>Ordinal</td>
<td>Scale from 1 to 5</td>
<td>$\beta_5 &gt; 0$</td>
</tr>
<tr>
<td><strong>Nutrition Awareness</strong></td>
<td>Continuous</td>
<td>PCA</td>
<td>$\beta_6 &gt; 0$</td>
</tr>
<tr>
<td><strong>Health Goals</strong></td>
<td>Continuous</td>
<td>PCA</td>
<td>$\beta_7 &gt; 0$</td>
</tr>
</tbody>
</table>

\[ \text{Number of Stars} = \beta_1 \text{Scenario}_1 + \beta_2 \text{Scenario}_3 + \beta_3 \text{Gender} + \beta_4 \text{Weight Control} + \beta_5 \text{Nutrition Knowledge} + \beta_6 \text{Nutrition Awareness} + \beta_7 \text{Health Goals} \]

The dependant variable, number of stars that items in the participant's basket are eligible for, could be any number from zero to three in each of the three categories.

Scenario 2 in which the participants saw the star icons as they might currently appear in a Canadian Grocery store was used as the base for comparison, so there is no expected sign for this variable. In scenario 1 participants saw no star icons, meaning
fewer products eligible for stars are expected to have been selected. In Scenario 3 the proposed star icons were used, so the expectation was that more products eligible for stars would have been selected. Since women tend to use nutrition labelling more than men, it was expected that female participants would select more items eligible for stars when labels were present in scenario 2 and 3 compared to scenario 1. Participants have a higher concern for weight control, greater nutrition knowledge, higher nutrition awareness, and stronger health goals are all expected to use the nutrition labelling system more, so there was an expectation of a positive effect on the dependent variable.

For summary statistics of the responses to the Survey Questions used to determine each of the variables mentioned in Table 3, see Appendix 2.

### 4.8 Model 2 - Multinomial Logit

A multinomial logit (mlogit) was estimated where the dependent variable has more than two categories. The impact of the shelf labelling system can be broken down to see more closely which product substitutions are being made between subjects in each shelf labelling condition. It can be seen directly if the different shelf labelling systems cause more consumers to switch from 0-star products to 1-star products, or from 0-star products to 2-star products, or from 0-star products to 3-star products. The independent variables for this analysis will remain the same as for the Poisson analysis.
## 5. Results

### 5.1 Poisson Overall Results

**Table 4: Overall Results of Poisson Regression**

<table>
<thead>
<tr>
<th></th>
<th>(1) Total Stars Purchased</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario One</td>
<td>-0.372** (-2.38)</td>
</tr>
<tr>
<td>Scenario Three</td>
<td>0.044 (0.30)</td>
</tr>
<tr>
<td>Gender</td>
<td>0.027 (0.20)</td>
</tr>
<tr>
<td>Weight Control</td>
<td>0.005 (0.03)</td>
</tr>
<tr>
<td>Nutrition Knowledge</td>
<td>0.119 (1.58)</td>
</tr>
<tr>
<td>Nutrition Awareness</td>
<td>-0.007 (-0.18)</td>
</tr>
<tr>
<td>Health Goals</td>
<td>0.017 (0.29)</td>
</tr>
<tr>
<td>Constant</td>
<td>0.483 (1.49)</td>
</tr>
<tr>
<td>N</td>
<td>116</td>
</tr>
<tr>
<td>Prob &gt; chi²</td>
<td>0.285</td>
</tr>
<tr>
<td>Pseudo R²</td>
<td>0.018</td>
</tr>
</tbody>
</table>

* t statistics in parentheses
  * p < 0.10, ** p < 0.05, *** p < 0.01
The Poisson regression shows a significant negative effect at the $p < 0.05$ level when comparing scenario 1 (no star labels) to scenario 2 (current star labels). Participants are selecting more products that are eligible for star icons when the stars are displayed compared to when they are not. There is no effect seen when comparing scenario 2 (current) to scenario 3 (proposed new star labels). Gender, weight control, nutrition knowledge, and nutrition awareness all showed no significant effect on the overall amount of stars in the participant's basket after choosing in all three categories.

### 5.2 Poisson Results by Category

Below in Table 5 are the results of the Poisson Regression separated by the product categories.
Table 5: Results of Poisson regression analysis by category

<table>
<thead>
<tr>
<th>Category</th>
<th>(1) High Heterogeneity</th>
<th>(2) Medium Heterogeneity</th>
<th>(3) Low Heterogeneity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario One</td>
<td>-0.451**</td>
<td>-0.545</td>
<td>-0.203</td>
</tr>
<tr>
<td></td>
<td>(-1.99)</td>
<td>(-1.61)</td>
<td>(-0.70)</td>
</tr>
<tr>
<td>Scenario Three</td>
<td>-0.040</td>
<td>0.371</td>
<td>-0.297</td>
</tr>
<tr>
<td></td>
<td>(-0.19)</td>
<td>(1.40)</td>
<td>(-0.95)</td>
</tr>
<tr>
<td>Gender</td>
<td>0.278</td>
<td>-0.401</td>
<td>0.052</td>
</tr>
<tr>
<td></td>
<td>(1.39)</td>
<td>(-1.55)</td>
<td>(0.20)</td>
</tr>
<tr>
<td>Weight Control</td>
<td>0.159</td>
<td>-0.970**</td>
<td>0.388</td>
</tr>
<tr>
<td></td>
<td>(0.80)</td>
<td>(-2.54)</td>
<td>(1.49)</td>
</tr>
<tr>
<td>Nutrition Knowledge</td>
<td>0.148</td>
<td>-0.039</td>
<td>0.248</td>
</tr>
<tr>
<td></td>
<td>(1.36)</td>
<td>(-0.29)</td>
<td>(1.54)</td>
</tr>
<tr>
<td>Nutrition Awareness</td>
<td>-0.068</td>
<td>0.033</td>
<td>0.041</td>
</tr>
<tr>
<td>(PCA)</td>
<td>(-1.23)</td>
<td>(0.47)</td>
<td>(0.55)</td>
</tr>
<tr>
<td>Health Goals</td>
<td>0.0569</td>
<td>-0.0968</td>
<td>0.0795</td>
</tr>
<tr>
<td>(PCA)</td>
<td>(0.65)</td>
<td>(-0.93)</td>
<td>(0.63)</td>
</tr>
<tr>
<td>Constant</td>
<td>-0.534</td>
<td>0.0610</td>
<td>-1.464**</td>
</tr>
<tr>
<td></td>
<td>(-1.13)</td>
<td>(0.11)</td>
<td>(-2.14)</td>
</tr>
<tr>
<td>N</td>
<td>116</td>
<td>116</td>
<td>116</td>
</tr>
<tr>
<td>Prob &gt; chi2</td>
<td>0.2853</td>
<td>0.0008</td>
<td>0.1606</td>
</tr>
<tr>
<td>Pseudo R²</td>
<td>0.0176</td>
<td>0.0993</td>
<td>0.0408</td>
</tr>
</tbody>
</table>

* t statistics in parentheses.
** * p < 0.10, ** p < 0.05, *** p < 0.01.

In the high heterogeneity category, there is a significant negative effect of Scenario 1 compared to Scenario 2 (p < 0.05). Scenario 1 was when no star icons were shown and Scenario 2 was when the current labelling system was used, so the negative effect of going from the current labelling system to no system was in line with the expectations. There was no significant effect observed between Scenario 2 and
Scenario 3 meaning the proposed system had no effect on the number of products eligible for stars that were selected. There was also no significant effect observed between any Scenario in the medium or Low heterogeneity categories.

Weight control showed a significant negative effect in the medium heterogeneity category (p < 0.05), but not in the high or low heterogeneity categories. Gender, nutrition knowledge, nutrition awareness and health goals all had no significant effect on the dependent variable in any of the categories.
### 5.3 Multinomial Logit Results

**Table 6: Results of multinomial logit analysis**

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Baseline (0 Stars)</th>
<th>1 Star</th>
<th>2 Stars</th>
<th>3 Stars</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High Med Low</td>
<td>High Med Low</td>
<td>High Med Low</td>
<td>High Med Low</td>
</tr>
<tr>
<td><strong>Category</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scenario One</td>
<td>- - -</td>
<td>0.70 0.10 -0.40 10.40 -0.79 0.15 -1.01* -16.07 -16.76</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1.20) (0.17) (-0.49) (0.00) (-0.88) (0.25) (-1.68) (-0.01) (-0.01)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scenario Three</td>
<td>- - -</td>
<td>0.13 0.15 -1.04 189.30 1.56** -0.49 -0.09 -1.05 -1.76</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.19) (0.22) (-1.10) (0.01) (2.30) (-0.72) (-1.7) (-0.76) (-1.01)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td>- - -</td>
<td>-0.61 -1.56*** -0.75 213.60 -0.27 0.34 0.53 -1.36 -0.69</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(-1.15) (-2.78) (-1.00) (0.01) (-0.41) (0.61) (1.01) (-1.05) (-0.32)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Weight Control</strong></td>
<td>- - -</td>
<td>0.06 -0.96 0.62 -70.77 -1.55* 0.98* 0.36 -15.32 -15.55</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.11) (-1.48) (0.77) (-0.01) (-1.87) (1.89) (0.68) (-0.01) (-0.01)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Nutrition Knowledge</strong></td>
<td>- - -</td>
<td>0.18 -0.12 0.56 41.16 -0.29 0.14 0.30 0.71 3.75*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.62) (-0.38) (1.19) (0.01) (-0.86) (0.45) (1.07) (0.84) (1.88)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Nutrition Awareness (PCA)</strong></td>
<td>- - -</td>
<td>-0.17 -0.07 0.26 -0.45 0.13 0.29* -0.15 -0.09 -0.59</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(-1.17) (-0.47) (1.16) (-0.00) (0.75) (1.74) (-1.02) (-0.29) (-1.24)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Health Goals (PCA)</strong></td>
<td>- - -</td>
<td>-0.13 0.09 -0.67 102.70 -0.29 -0.29 0.10 0.30 2.01*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(-0.51) (0.33) (-1.62) (0.01) (-0.98) (-0.99) (0.40) (0.54) (1.79)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Constant</strong></td>
<td>- - -</td>
<td>-1.37 0.30 -3.67* -641.60 -0.24 -2.26* -1.75 -3.97 -19.57**</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(-1.12) (0.23) (-1.83) (-0.02) (-0.17) (-1.72) (-1.47) (-1.11) (-2.05)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


$t$ statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
The results of the multinomial logit show only one instance in which the scenario has an impact on the number of eligible stars corresponding to the subjects selected food. This result appeared in the medium heterogeneity category when comparing 2-star products selected to 0-star products selected. The effect was significant at the 95% confidence interval. The result did not appear when comparing 0 stars to 1 star or 0 stars to 3 stars in the same category, or when comparing any number of stars in the high or low heterogeneity categories.

The results of the mlogit for the 2-star products in the high heterogeneity category are inconclusive due to the small sample size in this group. Only 2 participants selected a 2-star product in the high heterogeneity category, resulting in extremely high correlation for all independent variables in that group.

5.4 T-Test

A t-test was done on each of the three questions from the exit survey relevant for testing the participant's awareness, comprehension, and use of the star icons. Two sample t-tests were used to compare Scenario 2 (current star icons) and Scenario 3 (proposed new star icons). Scenario 1 was ignored, as those participants were not exposed to any star icons. Tests were one-tailed and did not assume equal variance. The results are below in table 7.
<table>
<thead>
<tr>
<th></th>
<th>Group</th>
<th>Mean</th>
<th>St. Dev</th>
<th>Mean Difference</th>
<th>t</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Awareness</strong></td>
<td>Scenario 2</td>
<td>0.558</td>
<td>0.502</td>
<td>-0.060</td>
<td>-0.520</td>
<td>0.605</td>
</tr>
<tr>
<td></td>
<td>Scenario 3</td>
<td>0.618</td>
<td>0.493</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Comprehension</strong></td>
<td>Scenario 2</td>
<td>0.395</td>
<td>0.495</td>
<td>-0.016</td>
<td>-0.180</td>
<td>0.857</td>
</tr>
<tr>
<td></td>
<td>Scenario 3</td>
<td>0.412</td>
<td>0.297</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Use Of</strong></td>
<td>Scenario 2</td>
<td>0.233</td>
<td>0.427</td>
<td>-0.032</td>
<td>-0.319</td>
<td>0.751</td>
</tr>
<tr>
<td></td>
<td>Scenario 3</td>
<td>0.265</td>
<td>0.448</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
6. Discussion

6.1 Hypothesis 1

Hypothesis 1 stated that consumers exposed to the proposed shelf labelling system in scenario 3 should have selected products eligible for more star icons after the shopping task when compared to subjects in scenario 1 or scenario 2.

The overall Poisson Analysis showed that there is a positive impact on the healthfulness of products purchased by participants when the current star shelf labels are available compared to when no labels are used. No such effect is seen when comparing the current shelf labels to the proposed new shelf labels.

These results were unexpected but could be due to several factors. Firstly, the cue added in the proposed system may not have been conspicuous enough. The theory was that the matching colour scheme of the extra box on the proposed labels would be enough to trigger re-salience for participants who had prior knowledge of the nutrition labelling system. All participants should have knowledge of the system since it was described in the information sheet they were asked to read prior to starting the task, however, it is possible not all participants read this information, or the information was not clear enough to make all participants understand it. This will be discussed further in the limitations section.

Alternatively, there were several limitations to this study, especially with regards to the sample and product selection. These will be discussed in depth later in this chapter, but any number of these limitations could have led to unexpected results and
further studies with broader samples, and more realistic shopping scenarios may find different results.

The multinomial logit analysis showed no significant effects in any of the scenarios, when comparing any number of stars on selected items, except in scenario 3, when comparing 0-star products to 2-star products in the medium heterogeneity category. The significant effect here suggests that in this one specific situation, subjects were more likely to buy a 2-star product, versus a 0-star product simply because of the change to the shelf labelling. This result shows some support for hypothesis 1, but only in this situation, all other situations show no support for the hypothesis. One possible explanation could be the specific product selection used in the study. Since there were only 8 products to choose from in each category, when in reality a grocery store would have dozens of options in each of these categories, it is possible that in the medium heterogeneity sample that was used there was a generally acceptable substitute for a 0 star product that was eligible for 2 stars, where in the other categories there may not have been products seen as such an easy switch. Interestingly though, since this effect is seen only in scenario 3, and not scenario 2, it suggests that regardless of how easy the substitution was, subjects only made that substitution when prompted with the new shelf labelling system used in scenario 3, and did not switch when exposed to the current shelf labelling system shown in scenario 2.
6.2 Hypothesis 2

There is some support for hypothesis 2 which stated the effect of the shelf labelling would be greater in the high heterogeneity categories. In the Poisson analysis by category, there is a significant negative effect of scenario 1 (no labels) compared to scenario 2 (current labels) only in the high heterogeneity category. One potential reason for this is because the medium and low heterogeneity categories were represented by breakfast cereal and frozen food respectively. These are categories that may be perceived by participants as unhealthy, so they may not be concerned about the nutritional content of the food. They may already see a purchase in this category as a treat, so they will be more considered with hedonic characteristics like taste because if you are going to buy something unhealthy, you might as well get the one you enjoy the most. This effect could have an impact on the low heterogeneity category, but also potentially the medium heterogeneity category depending on how cereals are perceived by the participant. Future studies could ask the participant about their perceived healthfulness of each category, in general, to see if this has an impact on their use of labels.

The results of the multinomial logit shed little light on hypothesis 2 since the significant effect was only seen in the medium heterogeneity category, and not in the high or low categories. As stated previously this could be due to the specific products chosen to represent each category, and future studies using a wider choice set may get clearer results on how the level of heterogeneity of front of package labels in a food category effects the impact of the labelling system.
6.3 Hypothesis 3

Hypothesis 3 stated that subjects exposed to the new labelling system in scenario 3 would report higher awareness, use and comprehension of the star icons compared to those who were exposed to no shelf labels, or current shelf labels in scenario 1 or 2 respectively.

Though at first glance, the statistics for self-reported awareness, comprehension and use of the star icons are higher in scenario 3 (Proposed New Star Icons) compared to Scenario 2 (Current Star Icons), the results of the t-test show no significant difference between the two scenarios in any of the three areas. These results do not support hypothesis 3 which proposed the new system would improve consumer awareness and use after the trial compared to the current system. The hypothesis was based on the theory of re-salience which states that a cue congruent with the context will become salient in a consumers mind via top-down processing (Bix et al., 2015). It was thought that participants would overlook the missing information on 0 star items and not think about the nutrition labelling system at all, so when the new cues used made the system salient in their mind no matter what product they were looking at, it would overall increase the awareness and use of the nutrition labelling, especially in low heterogeneity categories where a higher proportion of products have 0 stars. A possible explanation for this would be that participants are not overlooking the missing information at all. It has been shown that people with some degree of expertise are less likely to overlook missing information (Theeuwes & Van der Burg, 2013). For example, a mechanic would be less likely to overlook missing information about horsepower on a car advertisement. In this context, it was thought that effect would be covered by
accounting for those with a high degree of nutrition knowledge, nutrition awareness or specific health goals as they would be experts at picking healthy products. It could be that all participants in this sample have some degree of expertise when it comes to shopping for food in general which might be enough for them to be aware of missing information even without the extra cue in the proposed system.

6.4 Gender

In the results of the multinomial logit analysis it was observed that women were overall more likely to select products that were healthier in the medium heterogeneity category, but not in the high or low heterogeneity categories. This effect was specifically seen in the substation between a 0-star product and a 1-star product. The effect only appearing in one category was unexpected, especially since it was the moderate of the three categories. In the High Heterogeneity category, only three of the eight available items were not eligible for any stars, so the likelihood that most participants already were choosing items with stars in this category was quite high. This histogram in figure 4 shows this is the case. Bar far the category in which consumers picked the most items eligible for stars was the high heterogeneity category.

Potentially, with a much larger sample size, an effect may be seen in the high heterogeneity category since there will be more people who would have picked those 0-star products. This effect could also have been seen only in the medium heterogeneity category just because of the products included in the sample. Potentially there could be one cereal that is less healthy that is more appealing to men, or one that is more
healthy that is more appealing to women which could have skewed the results in just that category.

6.5 Weight Control

A participant's weight control goals impacted their purchase decisions in the medium heterogeneity category. The medium heterogeneity category saw a significant effect of weight control goals in both the Poisson and the multinomial logit regressions. The effect not appearing in the high heterogeneity category could be due to the fact there are more healthy products overall, so there is a higher chance participants would have picked healthier products anyways so the difference between the average consumer and the weight conscious one would be less exaggerated than in other categories where more people tend to select less healthy options. The histogram in Figures 4 supports this idea, showing in the low and medium heterogeneity categories 65-70% of participants selected 0-star products, while only around 47% chose 0-star products in the high heterogeneity category, and far more chose the 3-star products in this category than any other.
6.6 Other Variables

Participants Nutrition Knowledge, Nutrition Awareness, and Health Goals all had no effect on the number of stars in their basket overall, or in any category individually, or whether or not they bought a 0-star item. It was expected that these variables would have some impact on the stars purchased since the literature suggested they all have been found to impact the healthfulness of consumers food purchasing decisions (Gamburzew et al., 2016; Graham et al., 2012; Grunert & Wills, 2017; Hodgkins et al., 2012; Kim et al., 2019; Koen et al., 2016; Lewbel et al., 2013; Newman, et al., 2014; Sacks et al., 2009; Seigrist, et al., 2006). One reason they might not have had an impact could be due to the small, relatively homogenous sample, but it also may have been an effect the small choice set of products for the task, or the general unfamiliarity with the online shopping environment (only 3.3% of participants shop for food online regularly). A study with a larger demographic variability, more products to choose from in more categories, and a more familiar shopping environment might yield different results.
7. Contributions

7.1 Managerial Implications

Food retailers will find some of the results of this study insightful. Firstly, the observation that the currently used FOP labelling systems can still have an impact on consumer choice when used in an online environment is helpful for grocery chains when developing their online store web pages. It is especially useful since only a small proportion of respondents were familiar with online grocery shopping, so the results show even new users will benefit from the nutrition labels. A follow-up study comparing the effectiveness of online and in-store FOP labelling on a wider variety of products would help give more insightful results for food retailers.

Secondly, while most of the results do not support the US National Academies recommendation that the FOP labelling system should be used for every product in the store (even if they are not eligible for any star icons), the results do show that the heterogeneity of the category does not impact how effective the FOP labelling system is, so it should be used at least in every category.

Industry professionals can also use this information as a specific analysis of university students shopping habits, and potentially generalize it to the broader millennial consumer group. The results show they are likely to use nutrition information when shopping online and it will affect their purchase decisions, however overall a majority of them still buy the least healthy options, with 65-70% purchasing 0 star...
products in the low and medium heterogeneity categories, and 47% purchasing 0 star items in the high heterogeneity category.

### 7.2 Public Health Implications

From a policy perspective, this study adds to the body of research suggesting FOP labelling can be effective at helping consumers make healthier choices. The study does not support the notion that FOP labelling must be included on every single product in order to be useful, so it may not be significant evidence in the argument for mandatory FOP labelling system implemented by the government. It is important for policymakers to realize nutrition labelling is still important in the online space though, as online grocery shopping becomes more popular it will be increasingly important to know how to nudge consumers to healthier choices through this channel.
8. Limitations and Future Research

8.1 Limitations

This study has some limitations that should be noted. Firstly, the participants were all undergraduate students at the University of Guelph, so the sample was fairly homogeneous in several key areas. A sample with a wider variety of age, education, socioeconomic status, marital status, and whether or not they have children would have been more ideal for observing significant results and generalizing any conclusions.

Next, the study was done online, and only 3.3% of the participants reported regularly shopping for groceries online. This unfamiliarity with the environment for the majority of participants makes it harder to extrapolate the results to a physical store, however it did reveal that even to unfamiliar shoppers, SSI Nutrition labels help them make healthier choices.

It should also be noted that the sample size was relatively small (only 34 observations in Scenario 3). A larger sample size would have allowed for more complex analysis and inclusion of interaction effects. This also hindered the mlogit analysis since in the high heterogeneity category, only 2 participants selected a 2-star product which led to unusually high correlation for all the independent variables and results that could not be considered valid.

Also, the self-reporting that is relied on in this study may not accurately represent consumers actual actions since consumers tent to say they use nutrition information more often than they actually do when their actions are observed (Edge et al., 2014; Hodgkins et al., 2012). Similar studies using eye-tracking technology could better
measure if the participants actually looked at the Star Icons, and compared between products.

The product selection was a limitation. Since the sample size was small, participants couldn’t be given too many options or there was a risk there would be no significant difference between any of the items selected, and there would be less of a risk of some people finding nothing they wish to buy in a given category. Also, in the interest of keeping the survey’s estimated time of completion under 15 minutes, only 3 categories could be included. Ideally, multiple categories of every level of heterogeneity would have been included to account for any unforeseen differences in a specific category. A similar experiment with a larger sample size and participants who can spend much longer on the task could make a mock website that is more representative of the selection available on a real online grocery store. If not, several pre-tests could be done to get baseline values for the preference of many different products then certain products could be included/excluded if they were at risk of skimming the results.

Another potential limitation was participants prior knowledge of the system. The shelf labelling system this study was attempting to copy was reported to be known amongst just 8.7% of Canadian Consumers (Hobin et al., 2017). In order to test the hypothesis in this study, the participants must know of the labelling system and understand what it means. For this reason, an information package was included at the start of the study which all participants were asked to read. This package contained information on the Star Icons and what they represent. It is possible not all participants read this information, or that the amount of information provided was not sufficient to make all participants fully understand the system. Ideally, with a much larger sample
size, only participants already knowledgeable about the system would be included. Due to the small sample size, the study attempted to artificially make all participants know of the system beforehand, this appears to not have worked as expected, so further studies should other focus on subjects who already have some knowledge, or find a more effective way to teach participants before the choice task.

Finally, there was a technical limitation with the software used since Qualtrics did not have a question type that could be manipulated and customized aesthetically to look enough like an online grocery store while still maintaining the functionality to be able to force participants to only choose one response. In the interest of making the survey look authentic, several responses had to be eliminated because participants did not follow the instructions and selected multiple products in one category.

### 8.2 Future Research

Due to the limitations of the sample used, the most logical next step would be to repeat the study using a broader sample of the general population. A larger sample size could be used along with a larger subset of products to choose from and more categories. If those results showed any positive results for the proposed labelling system, then a further study could look at this concept into a lab setting, and eventually a real-world environment. These studies would be important to eliminate any potential bias from self-reporting that happens in survey studies of this nature, as well as helping to make results more generalizable by taking into account price, and not setting any limitations on how many items a participant would have to pick.
Further studies should also look at giving participants more options to switch between categories. Several studies already show the effectiveness of Nutrition Labelling on helping consumers swap items in the same category, but there is no substantial evidence of a system that helps consumers effectively compare products between categories. If there was evidence found for a labelling system that helped consumers make comparisons between categories, it would strongly support the US National Academies recommendation that the labelling system should be applied across all food products.
9. Conclusion

There is a clear need for large scale interventions to help consumers make healthy choices and curb the obesity epidemic in today’s society (Smith et al., 2002). With grocery stores being the main source of consumer’s food purchasing and wielding power in the supply chain, shelf labelling seems to be a promising intervention technique (Watson et al., 2014). This paper looked at how shelf labelling can be improved by implementing a key recommendation from the US National Academies study on FOP labelling, to include a reference to the labelling system on all food products store-wide (Wartella et al., 2010). The main theory was that due to the feature positive effect, consumers will overlook any missing information if the FOP labels are not shown on some shelf tags, such as the tags for items that do not meet the minimum nutrition requirements for a certain icon, like a star or checkmark. This effect was expected to be greater in food categories with a high heterogeneity of the number of star icons a product is eligible for. The higher exposure of the consumer to the cues relating to the FOP labelling system was hypothesized to increase their awareness of the system after shopping. These thoughts were tested through an online simulated shopping task. Results suggest that though there are specific situations in which the proposed changes to the shelf labelling system could help a consumer make healthy choices, in most cases the extra cue goes un-used. The new system was found to be effective in medium heterogeneity categories and helped consumers switch from products eligible for 0 stars to products eligible for 2 stars.
The implications for store owners are positive since it shows FOP labelling can be used successfully online, and the proposed new system will not have a negative impact on overall sales. In terms of public policy, though this study does not lend weight to the argument that FOP labelling should be included on all products, it does show that it can be useful in certain situations. Overall there is more research needed, and this study should be expanded on using a more diverse sample size, larger product offerings and a physical shopping environment in order to gain more understanding of the specific situations in which the proposed FOP labelling system can improve on the existing models.

The implications for store owners are positive since it shows FOP labelling can be used successfully online, and the proposed new system will not have a negative impact on overall sales. In terms of public policy though this study does not lend weight to the argument that FOP labelling should be included on all products, it does show that it can be useful in certain situations. Overall there is more research needed, and this study should be expanded on using a more diverse sample size, larger product offerings and a physical shopping environment in order to gain more understanding of the specific situations in which the proposed FOP labelling system can improve on the existing models.
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APPENDICES

Appendix 1: Survey Questions

*Gender:*

I identify my gender as: ______________

*Weight Control:*

Do you have any specific health or fitness goals, please check all that apply

- Weight Control
- Performance
- Health Maintenance
- Disease Prevention
- Other (please specify) ______________

*Nutrition Knowledge:*

<table>
<thead>
<tr>
<th>I am</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Unsure</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledgeable about nutrition labelling on food products</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Health Goals* (PCA of the following):
## Nutrition Awareness

### PCA of the following:

<table>
<thead>
<tr>
<th>I am...</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Unsure</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continually concerned about personal health</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exercising regularly</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Counting my calories</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Nutrition Awareness (PCA of the following):

<table>
<thead>
<tr>
<th>When shopping for food products I...</th>
<th>Never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Mostly</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>Look at the nutrition facts panel</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Read the ingredients list</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Look for nutrition information on the front of the package</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Directly compare nutrition information for two products in the same aisle</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>When shopping for food products I...</td>
<td>Never</td>
<td>Rarely</td>
<td>Sometimes</td>
<td>Mostly</td>
<td>Always</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>-------</td>
<td>--------</td>
<td>-----------</td>
<td>--------</td>
<td>--------</td>
</tr>
<tr>
<td>Directly compare nutrition information for two products in different aisles</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>I am...</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Unsure</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Watching the amount of salt in my diet</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paying attention to the amount of red meat I consume</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cutting back on snacks and treats</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avoiding food with additives and preservatives</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paying attention to my sugar intake</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Watching the amount of at I consume</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>It is important to me that on a typical day the food I eat...</td>
<td>Unimportant</td>
<td>Slightly Unimportant</td>
<td>Neither important or Unimportant</td>
<td>Slightly Unimportant</td>
<td>Important</td>
</tr>
<tr>
<td>------------------------------------------------------------</td>
<td>-------------</td>
<td>---------------------</td>
<td>----------------------------------</td>
<td>---------------------</td>
<td>----------</td>
</tr>
<tr>
<td>Is high in fibre</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contains natural ingredients</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contains a lot of vitamins and minerals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix 2: Shopping Task Example

Example of full screen seen by participant during selection task (scenario 3, high heterogeneity). The products and Star Icons would be switched out depending on the scenario and category. All possible combinations are shown below.
Scenario 1 High Heterogeneity

Scenario 1 Medium Heterogeneity
<table>
<thead>
<tr>
<th>Scenario 1 Low Heterogeneity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>President's Choice Blue Menu</strong></td>
</tr>
<tr>
<td><strong>Healthy Choice Gourmet Steamer</strong></td>
</tr>
<tr>
<td><strong>President's Choice Blue Menu</strong></td>
</tr>
<tr>
<td><strong>Amy's Macaroni &amp; Cheese</strong></td>
</tr>
<tr>
<td><strong>Swanson</strong></td>
</tr>
<tr>
<td><strong>Cavendish Farms Focaccia</strong></td>
</tr>
<tr>
<td><strong>High Liner Pan Sear Selecta</strong></td>
</tr>
<tr>
<td><strong>Jans</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scenario 2 High Heterogeneity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Neilsen 1% Partly Skimmed Milk</strong></td>
</tr>
<tr>
<td><strong>Neilsen 2% Milk (2 L)</strong></td>
</tr>
<tr>
<td><strong>Neilsen Flavoured Milk, Chocolate (2 L)</strong></td>
</tr>
<tr>
<td><strong>President's Choice Plain Skyr</strong></td>
</tr>
<tr>
<td><strong>Danone Activia Fibe</strong></td>
</tr>
<tr>
<td><strong>Astro Original Balkan Style</strong></td>
</tr>
<tr>
<td><strong>IDS0 Fat Free Yogurt, Strawberry/Raspberry/Blueberry/Blueberry (6x10g)</strong></td>
</tr>
<tr>
<td><strong>Liberte Greek Yogurt, Wild Blueberry 0% (4x100g)</strong></td>
</tr>
</tbody>
</table>
Scenario 2 Medium Heterogeneity

Scenario 2 Low Heterogeneity
Scenario 3 High Heterogeneity

Scenario 3 Medium Heterogeneity
Scenario 3 Low Heterogeneity
### Appendix 3: Summary Statistics of Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Frequency</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Min</th>
<th>Max</th>
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<tr>
<td>Scenario</td>
<td>119</td>
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<tr>
<td>1=No Labelling</td>
<td>42</td>
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<td>35.29</td>
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<td>2=Current Labelling</td>
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<td>3=Proposed Labelling</td>
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<td>Gender</td>
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<tr>
<td>1= Female</td>
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<td>0= Male</td>
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<td>Weight Control</td>
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<tr>
<td>1=yes</td>
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<tr>
<td>0=no</td>
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<tr>
<td>Nutrition Knowledge (high self reported knowledge of nutrition labelling)</td>
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<tr>
<td>1=Strongly Disagree</td>
<td>1</td>
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<td>0.84</td>
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<tr>
<td>2=Disagree</td>
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<td>4=Agree</td>
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<tr>
<td>5=Strongly Agree</td>
<td>21</td>
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<tr>
<td>Nutrition Awareness (PCA)</td>
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<td>Health Goals (PCA)</td>
<td>PCA</td>
<td>119</td>
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</tr>
</tbody>
</table>
Appendix 4: Consent Form

Each participant saw, and agreed to the following consent form before beginning the study.

CONSENT TO PARTICIPATE IN RESEARCH

You are asked to participate in a research study conducted by:

Dr. Tirtha Dhar (Associate Professor, Marketing & Consumer Studies). The results of these studies will be used towards an academic paper.

If you have any questions or concerns about the research, please feel free to contact Dr. Tirtha Dhar, Associate Professor, Marketing and Consumer Studies, 519-824-4120 ext. 52023, tdhar@uoguelph.ca. The results of the study can be obtained by contacting Dr. Dhar, or the student investigator, Mitchell Torres, mtorres@uoguelph.ca

This is an online study and participation can take place at any location and at any time based on your convenience.

PURPOSE OF THE STUDY

The purpose of this research is to evaluate the impact of how food is displayed on consumer choice in an online retail environment.

PROCEDURES

If you volunteer to participate in this study, you will be asked to perform the following tasks:
1. Read a brief information package

2. Browse a simulated online grocery store environment and select which food products you would most likely purchase from various categories

3. Complete a questionnaire about your decision-making process while you completed the shopping task

The survey will take approximately 10 minutes to complete

POTENTIAL RISKS AND DISCOMFORTS

There are no foreseeable risks, discomforts or inconveniences that can result from participating in this study.

POTENTIAL BENEFITS TO PARTICIPANTS AND/OR TO SOCIETY

Your participation may help you gain insight into the research process. Furthermore, your participation will help advance knowledge in the field of marketing and consumer studies.

PAYMENT FOR PARTICIPATION

Participants will be given a 2% course credit in exchange for participation. No monetary payment will be made.
CONFIDENTIALITY

Every effort will be made to ensure confidentiality of the participants. No direct identifying information will be collected. All data will be stored on locked password protected computers and will be held for a period of up to five years after the completion of the experiment, then securely destroyed.

PARTICIPATION AND WITHDRAWAL

You can choose whether to be included in this study or not, and may also remove your data from the study prior to submitting your survey responses, without penalty. You may also refuse to answer any questions you do not want to answer.

RIGHTS OF RESEARCH PARTICIPANTS

This project has been reviewed by the University of Guelph Research Ethics Board for compliance with federal guidelines for research involving human participants (REB# 18-02-012).

You are not waiving any legal claims, rights or remedies because of your participation in this research study.

If you have questions regarding your rights and welfare as a research participant in this study (REB# 18-02-012), please contact: Director, Research Ethics; University of Guelph; reb@uoguelph.ca; (519) 824-4120 (ext. 56606)
I have read the information provided for the study “Customer Inspiration and the Source of Communications” as described herein. My questions have been answered to my satisfaction, and I agree to participate in this study.

Agree

Disagree