The Development of Nutri-eSTEP

by

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ABSTRACT

THE DEVELOPMENT OF NUTRI-ESTEP

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Professor Janis Randall Simpson

This thesis presents the methods and results of a multiphase project that was conducted to develop online adaptations of the NutriSTEP® questionnaires for parents of young children (18 – 35 months and 3-5 years of age). The development of Nutri-eSTEP used an iterative process involving parents and an advisory committee of registered dietitians and health professionals. The phases guiding the development process included: 1) key intercept interviews; 2) review of feedback messages; 3) usability testing; 4) a survey to determine importance of changes; 5) satisfaction survey; and, 6) finalization and translation. Results from each phase were used to create and revise the pilot platform. Nutri-eSTEP serves as a knowledge translation vehicle to raise parental awareness of their children’s nutritional needs while providing resources to support self-management.
ACKNOWLEDGEMENTS

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# TABLE OF CONTENTS

**ACKNOWLEDGEMENTS** ........................................................................................................... iii

**TABLE OF CONTENTS** ........................................................................................................... iv

**LIST OF TABLES** ................................................................................................................... vii

**LIST OF FIGURES** ............................................................................................................... viii

**LIST OF ABBREVIATIONS** ............................................................................................... ix

**CHAPTER 1** ........................................................................................................................ 1

1.0 Introduction ...................................................................................................................... 1

**CHAPTER 2** ........................................................................................................................ 3

2.0 Literature Review .............................................................................................................. 3

2.1 Background ...................................................................................................................... 3

2.2 Dissemination of NutriSTEP ........................................................................................... 6

2.3 Screening/Ethical Screening ............................................................................................ 7

2.4 Self-Management For Health ......................................................................................... 8

2.4.1 Definition, Purpose, and Outcomes ........................................................................... 8

2.4.2 Self Management Health Tools .................................................................................. 11

2.4.3 Interactive Self-Management Health Tools ............................................................... 12

2.4.4 Health Self-Management on the Internet ................................................................. 13

2.4.5 Nutri-eSCREEN ......................................................................................................... 14

2.4.6 The Role of Parents/Caregivers in Self-Management................................................ 14

2.5 Knowledge Translation .................................................................................................... 15

2.5.1 Knowledge-to-Action Cycle ...................................................................................... 16

2.5.2 Knowledge Translation and The Health Belief Model ........................................... 17

2.5.3 Social Cognitive Theory ........................................................................................... 18

2.5.4 e-Health Literacy ...................................................................................................... 19

2.5.5 Development of Online Self-Management Tools ..................................................... 20

2.6 Usability Methodology ..................................................................................................... 21

2.6.1 Heuristics .................................................................................................................. 22

2.6.2 Cognitive Walkthrough ............................................................................................. 22

2.6.3 Cognitive Interview & Think Aloud Technique ........................................................ 23

2.7 Conclusion ....................................................................................................................... 24

**CHAPTER 3** ........................................................................................................................ 25

3.1 Rationale & Summary ..................................................................................................... 25
6.0 Overall Discussion .............................................................................................................. 79
6.1 Participants ........................................................................................................................ 80
6.2 eScreening tools .................................................................................................................. 82
6.3 Phase 1: Key Informant Interviews .................................................................................... 82
6.4 Phase 2: Development and Review of Feedback Messages ................................................. 84
6.5 Phase 3: Website Mock Design and Usability Testing ......................................................... 87
6.6 Phase 4: Survey to Identify Key Changes .......................................................................... 88
6.7 Phase 5: Review of Toddler Nutri-eSTEP and satisfaction of final product .................... 89
6.8 Phase 6: Finalization and translation of website ............................................................... 90
6.9 Strengths .............................................................................................................................. 91
6.10 Limitations ......................................................................................................................... 94
6.2 Next Steps ........................................................................................................................... 95
6.3 Implications for Practice .................................................................................................... 96
6.4 Contributions to Literature ............................................................................................... 97
6.5 Conclusions ......................................................................................................................... 97
6.6 References .......................................................................................................................... 99

APPENDICIES ............................................................................................................................

Appendix A: Ethics Approval.................................................................................................. 101
Appendix B: Five Phases of Parent Advisors participation ....................................................... 102
Appendix C: Parent Advisor Message Review Example........................................................ 103
Appendix D: Key Intercept Interview Guide with Parent Advisors on Nutri-eSCREEN ... 104
Appendix E: Usability Testing 'Think Aloud' Interview Guide and Directions ......................... 106
Appendix F: Importance of Changes Survey .......................................................................... 110
Appendix G: Overall Satisfaction Survey ................................................................................ 112
Appendix H: Screening Questionnaire for Studies .................................................................. 114
Appendix I: Example of Letter (Usability Study) ..................................................................... 115
Appendix J: Consent Form ....................................................................................................... 120
Appendix K: Background Information of Participants ............................................................ 122
LIST OF TABLES

Table 1.0: Study Design for Nutri-eSTEP .......................................................... 34
Table 2.0: Participants in Nutri-eSTEP Development .......................................... 35
Table 3.0: Overview of methods in the multiphase design of the iterative process used in developing the online Nutri-eSTEP ................................................................. 48
Table 4.0: Demographic Characteristics of Parent Participants in the Development of Nutri-eSTEP ............................................................................................................. 56
Table 5.0: Quantitative Feedback from Usability Study on the Preschool Nutri-eSTEP 60
Table 6.0: Selected Importance of Change Survey Responses ............................... 64
LIST OF FIGURES

Figure 1.0: Timeline of NutriSTEP® Development (Randall Simpson, Keller, Rysdale, & Beyers, 2008; Randall Simpson, 2013). *Adapted with permission.* ................................. 4
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>CIHR</td>
<td>Canadian Institutes of Health Research</td>
</tr>
<tr>
<td>DC</td>
<td>Dietitians of Canada</td>
</tr>
<tr>
<td>EWCFG</td>
<td>Eating Well with Canada’s Food Guide</td>
</tr>
<tr>
<td>IT</td>
<td>Information Technology</td>
</tr>
<tr>
<td>HBM</td>
<td>Health Belief Model</td>
</tr>
<tr>
<td>HSP</td>
<td>Health Service Provider</td>
</tr>
<tr>
<td>KT</td>
<td>Knowledge Translation</td>
</tr>
<tr>
<td>NAC</td>
<td>National Advisory Committee</td>
</tr>
<tr>
<td>NutriSTEP®</td>
<td>Nutrition Risk Screening Tool for Every Preschooler</td>
</tr>
<tr>
<td>PA</td>
<td>Parent Advisor</td>
</tr>
<tr>
<td>PV</td>
<td>Parent Volunteer</td>
</tr>
<tr>
<td>RD</td>
<td>Registered Dietitian</td>
</tr>
<tr>
<td>SCREEN</td>
<td>Seniors in the Community: Risk Evaluation for Eating and Nutrition</td>
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<tr>
<td>SCT</td>
<td>Social Cognitive Theory</td>
</tr>
</tbody>
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CHAPTER 1

1.0 Introduction

NutriSTEP® (Nutrition Screening Tool for Every Preschooler) and Toddler NutriSTEP® are valid and reliable 17-item, parent-administered, nutrition risk screening questionnaires, available for both toddlers (18 – 35 months) (Randall Simpson, 2014), and preschoolers (3-5 years) (Randall Simpson, Keller, Rysdale, & Beyers, 2008). The focus of this research has been to take the existing NutriSTEP® tools and create online adaptations called Nutri-eSTEP. Nutri-eSTEP webpages include online adaptations of NutriSTEP® and Toddler NutriSTEP®, with accompanying nutrition education feedback and links to resources. Hosted on the Dietitians of Canada (DC) website, a credible source of nutrition information in Canada, Nutri-eSTEP is available in both English and French.

Nutri-eSTEP will provide parents of toddlers and preschoolers access to these nutrition risk screening tools and will raise parental nutrition awareness by providing strategies and resources to support self-management. Customized feedback based on results of the NutriSTEP® questionnaire(s), including motivational and educational messages aimed to initiate behaviour change are provided. Additionally Nutri-eSTEP will serve as a resource for dietitians and clinicians. Data collected on the Nutri-eSTEP website may be of benefit to public health agencies for planning, evaluation, and monitoring.
The development of Nutri-eSTEP occurred in six key phases. These phases were; 1) interviews with an established parent advisory committee; 2) creation and review of feedback messages; 3) usability testing and interviews using the pilot platform with parents; 4) a survey to determine importance of changes to the mock website; 5) review of toddler website and evaluation of satisfaction and, 6) finalization and translation of website. Testing was also done to determine intermodal reliability of Nutri-eSTEP. Additionally, an expert advisory panel of nutrition health professionals (National Advisory Committee (NAC)) was established to provide guidance to the project, reflect on results, provide feedback, and aid in the knowledge translation (KT) process.

This project focuses on the overall process of the development of Nutri-eSTEP and specifically the role of parent advisors as the target group. The intermodal reliability phase is the focus of another research project.
CHAPTER 2

2.0 Literature Review

This literature review identifies key concepts and considerations involved in the creation of the final Nutri-eSTEP website.

2.1 Background

The NutriSTEP® questionnaires (www.nutristep.ca) are valid and reliable, 17-item questionnaires designed for the parents/caregivers of preschoolers and toddlers who live in the community with no apparent disease (Randall Simpson et al., 2008; Randall Simpson, 2014). Once completed, a score is generated which indicates one of three levels of nutritional risk: no nutrition problems; some nutritional problems/concerns; at nutritional risk. Based upon the nutritional risk score, appropriate nutrition educational resources are suggested as well as the option for referral to a registered dietitian (Randall Simpson et al., 2008).

The NutriSTEP® questionnaires are based on five key attributes found to be the most prominent reasons to identify nutrition risk. These include: a) factors affecting food intake; b) food security; c) feeding environment; d) physical growth; and, e) physical activity and sedentary behaviour (Randall Simpson et al., 2008).

Face and content validity were carried out in the early phases of the NutriSTEP® project. Criterion validity and test retest reliability were completed for both the preschooler and toddler versions (Randall Simpson et al., 2008; Randall Simpson, 2014).
NutriSTEP® has involved thousands of preschoolers, toddlers, and their parents in its over 15 years of existence (Randall Simpson et al., 2008).

**Figure 1.0: Timeline of NutriSTEP® Development (Randall Simpson, Keller, Rysdale, & Beyers, 2008; Randall Simpson, 2014). Adapted with permission.**

<table>
<thead>
<tr>
<th>Phase</th>
<th>Description</th>
<th>Dates</th>
<th>Key Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feasability Phase</td>
<td>Initial tool conceived, Literature Review, Dialogue with stakeholders, Deliver tool at health fair, Feasability assessment</td>
<td>1998 - 2000</td>
<td></td>
</tr>
<tr>
<td>Phase I</td>
<td>Draft tool developed based on 20 Sudbury &amp; District parent focus groups (n=200), 3 readiness health fairs (n=180), 121 key intercept parent interviews</td>
<td>2001 - 2002</td>
<td>National, provincial, and local nutrition professional consultation</td>
</tr>
<tr>
<td>Phase II A</td>
<td>Provincial tool refinement to assess content and cultural appropriateness for all Ontario preschoolers</td>
<td>2002 - 2003</td>
<td>19 parent focus groups (n=170); 4 readiness health fairs (n=175)</td>
</tr>
<tr>
<td>Phase II B</td>
<td>National tool refinement to assess content and cultural appropriateness for all Canadian preschoolers</td>
<td>October 2002 to September 2004</td>
<td>322 research interviews (English, French) in 4 provinces</td>
</tr>
<tr>
<td>Phase III</td>
<td>Validation and Test-retest, Reliability to determine sensitivity and specificity of food items and risk level scores (low, moderate, high)</td>
<td>October 2004 to September 2006</td>
<td>~300 nutrition assessments (English, French, with parents and their preschoolers across Ontario along with another ~150 retests (English) with with parents across Ontario</td>
</tr>
<tr>
<td></td>
<td>Implementation pilots taking place in a number of Canadian sites as well as one US site</td>
<td></td>
<td>Ongoing national, provincial and local knowledge transfer</td>
</tr>
</tbody>
</table>
Phase B: Refinement

2010-2012

Key intercept interviews with parents, consultation with pediatric nutrition experts

Toddler Version Phase A: Content Validity

2010-2012

Literature review, parent focus groups, consultation with pediatric nutrition experts, creation of draft toddler NutriSTEP®

Distribution Phase

2008

Tool made available for distribution
### Phase C: Construct Validity & Reliability

**2011 - 2012**

Completion of toddler NutriSTEP twice, 2 weeks apart, comparison to characteristics thought to be associated with nutrition risk

### Phase D: Criterion Validity

**2011 - 2012**

Comparison of detailed nutritional assessment to toddler NutriSTEP

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### 2.2 Dissemination of NutriSTEP

NutriSTEP® has been developed over the past fifteen years with the preschool version made available in 2008 for distribution (Randall Simpson et al., 2008). The toddler version was adapted from the preschool version in 2012 (Randall Simpson, 2014). NutriSTEP® questionnaires are most commonly accessed by parents from health professionals through Family Health Teams, physicians, Public Health Units, etc. (Persaud, 2013; Watson-Jarvis, McNeil, Fenton, Campbell, 2011).

Licenses for the NutriSTEP® questionnaires are available through Flintbox ([www.flintbox.com](http://www.flintbox.com)). There is a fee based on the number of copies being purchased. There are limited quantities of free preschool NutiSTEP® print copies available in Ontario, which can only be accessed through Service Ontario Publications via Public Health Units.
2.3 Screening/Ethical Screening

Nutrition screening has become an increased necessity as populations that require nutrition support are increasing (Keller, Brockest, & Haresign, 2006). Nutrition screening is identified as a secondary prevention form of health care that can help provide early detection of those who are at nutrition risk (Keller et al., 2006). Nutrition risk screening can be completed at any time as long as the ethical screening process is followed and has benefits for the target population (Keller et al., 2006).

Ethical screening is a process to ensure that the needs of individuals being screened are met and that appropriate assessment is completed. Valid and reliable screening tools require: a specific target population; a screening location; appropriate resources and referrals; and, potential for follow up (Keller, Haresign, & Brockest, 2007; Rush, 1997; Rysdale et al. 2011).

NutriSTEP® currently follows an ethical screening process in which parents are directed by a health service provider (HSP) to credible resources and follow up, including RD services. Yet, individualized guidance to support behaviour change generally does not occur unless clients self-identify. Often, nutrition risk is self-identified when a problem arises that could have been prevented (Rush, 1997). Since nutrition screening is a viable self-assessment tool, it can provide early identification and motivation to seek out nutrition education and resources that promote behaviour change (Randall Simpson, 2011).

‘How To Build a Healthy Preschooler’ and ‘How to build a Healthy Toddler’ are educational booklets created within the NutriSTEP® project; both have been evaluated by
the stakeholders (parents) who would be accessing them to assure readability and comprehension (Rysdale, 2008). Incorporating the health literacy skills of parents, these booklets are designed to provide parents with nutrition education linked to the questions on the NutriSTEP® screening tools (Rysdale, 2008). An increase in parental knowledge of nutrition risk has been reported from the educational booklet; further, many parents/caregivers indicated a desire for further nutrition information (Rysdale, 2008). To provide ethical nutrition screening in an online setting, appropriate feedback and options for follow up are necessary.

2.4 Self-Management For Health

2.4.1 Definition, Purpose, and Outcomes

Self-management is defined as the ability to manage symptoms, treatment, and lifestyle changes related to chronic conditions (Barlow, Wright, Sheasby, Turner, & Hainsworth, 2002; Coleman & Newton, 2005; Glasgow, Davis, Funnell, Beck, 2003). Self-management requires the ability to independently monitor health conditions in order to maintain an adequate quality of life. The overall goal of this process is to encourage individuals to initiate and regulate healthy behaviours (Barlow et al., 2002; Glasgow et al., 2003). Self-management is a preventative strategy in which individuals undertake day-to-day tasks to reduce, control, or prevent chronic illnesses (Lorig & Holman, 2003). Most self-management strategies are completed through at-home management techniques or changes in lifestyle that are most often suggested by an HSP (Nakagawa-Kogan, Garber, Egan, & Hendershot, 1988).
Self-management strategies have been developed for a variety of chronic illnesses in order to help bridge the gap between patients and HSPs who have limited time to individually counsel patients (Barlow et al., 2002). Self-management can be used as a means to ensure that clients’ needs are being met while simultaneously reducing the demands placed on the health care system and HSPs (Barlow et al., 2002). Increasingly, self-management is being adopted for interventions of chronic illnesses (Barlow et al., 2002). More recently, self-management has been used as a means of empowerment through the use of online applications, although more research into the effectiveness of these applications are required (Samoocha, Bruinvels, Elbers, Anema, & van der Beek, 2010). Self-management is typically addressed as an intervention to help cope with chronic illnesses; however, there are few self-management interventions designed to address those with no diagnosed illnesses as a preventative or screening strategy.

Currently, self-management research has been mainly directed towards adults and those with chronic illnesses. The development and implementation of self-management tools to support the management of chronic illnesses is identified as an important and integral part of primary care (Glasgow et al., 2003). However, there is a lack of understanding regarding self-management interventions for children and their parents/caregivers (Barlow et al. 2002). Little research or follow-up has been conducted on those who do not participate in self-management interventions (Barlow et al. 2002). It may be that those who do not participate do not have intention to change their behaviour or learn new skills (Barlow et al. 2002). Alternatively, it is possible that funding for the creation of self-management interventions focus on chronic disease rather than
prevention or screening to decrease time that medical practitioners spend with patients and costs of health care.

Currently, the predominant mode of accessing existing self-management programs is individualized direction provided by a health professional (Barlow et al., 2002). However, a need exists for individuals to obtain education through self-management and community resources to reduce barriers existing for other self-management strategies requiring a health professional (Coleman & Newton, 2005).

Self-management outcomes are facilitated through the individual, and outcomes are typically evaluated through the measurement of behaviour change (Glasgow et al., 2003). Web-based health interventions have shown promise with some positive effects being shown on patient empowerment and self-efficacy (Samoocha et al., 2010). Glasgow et al. (2003) suggest that, to obtain positive outcomes from self-management strategies, the tool must be: a) patient centered; b) ongoing and iterative; c) inclusive of collaborative goal setting and decision making; and, d) incorporate problem solving, outreach, and follow up.

There are many limitations to determining the effectiveness of web-based self-management research. Low participant compliance in web-based interventions suggests that web-based self-management may not be the preferred or the most sustainable medium for obtaining health information for all population groups (Samoocha et al., 2010). Nevertheless, it is suggested that self-management interventions that aim to increase knowledge, promote behaviour change, and improve self-efficacy are effective.
However, further research is needed to determine if the benefits are short or long-term (Barlow et al., 2002).

Yet, internet self-management programs have been shown to improve empowerment in disease prevention. Online educational interventions are an important mode to consider for those wanting to learn about prevention (Fleisher et al., 2012).

2.4.2 Self Management Health Tools

Self-management tools appear in a variety of different formats. These can include brochures, in-person sessions within a clinical setting, handouts, websites, and telephone helplines aimed at promoting self-management. Most commonly, health care professionals provide verbal counsel to clients at the time of their appointments. However, patients often have further questions following the appointment, demonstrating the necessity of written handouts as an important strategy for patient education (Hoffman & Worrall, 2004).

Research has shown that brochures are typically too advanced with regard to reading level, do not always contain accurate information, lack specific behavioural purpose to the patient, and/or have a confusing layout (Hoffman & Worrall, 2004). It is thought that most health-based written information leaflets have problems with readability and usability (Gal & Prigat, 2005). Written health information should be based on the target group’s ‘real skills’ and not on the assumption that further explanations will be provided by a health care provider at a later time (Gal & Prigat, 2005). Therefore, given the disparity of written health information and patients’ reading levels, it is recommended that the target population be included in the development of
reading material as often as possible to ensure the usefulness and appropriateness of the product (Gal & Prigat 2005; Hoffman & Worrall, 2004).

A study designed to evaluate the effectiveness of different modes of program implementation found that participant enrolment was greatest for website and telephone self-management, and lowest for in-person programs (Lawrence et al., 2010). Each mode of program implementation attracted different demographics, with the website modality appealing to those in the younger age ranges (Lawrence et al., 2010). Furthermore, web-based programs were shown to be the most cost-effective, and at the same time provided more guidance to typically inaccessible audiences (Lawrence et al., 2010).

2.4.3 Interactive Self-Management Health Tools

Mobile applications and personal digital assistance (PDA) technologies have been used in behavioural interventions by providing ‘in the moment’ responses to users’ needs (Duncan et al., 2011). A randomized control study assessing a PDA-based weight loss intervention tool suggested that technology-based interventions produce improved weight-loss results compared to interventions that did not use technology (Duncan et al., 2011). However, these results lack generalizability as the participants were already enrolled in a weight-loss program at the time of recruitment (Duncan et al., 2011) and therefore may already have been in a contemplation stage of behaviour change.

A separate review evaluating the effectiveness of mobile-health technology-based behaviour change and disease management in health care found that the majority of benefits were short-term, but might show clinical significance if behaviour was sustained long-term (Free et al., 2013). Their findings also suggest that mobile technologies often
incorporate few external sources and may be found to be more effective if they include links to health-related resources such as many online self-management interventions that have been shown to be effective (Free et al., 2013).

2.4.4 Health Self-Management on the Internet

Different self-management tools exist, particularly for adults and older adults managing chronic conditions. However, few of these tools are publically available, without cost and few are on the internet. Studies have shown that 58 - 80% of internet users access health information online through search engines such as Google (Mackert, Kahlor, Tyler, & Gustafson, 2009; Samoocha, Bruinvels, Elbers, Anema, & van der Beek, 2010). Using the internet for self-management of health makes information widely accessible and anonymous.

Obtaining health information online has been shown to improve understanding of health conditions and reduce unnecessary visits to health professionals, although users can find it difficult to access and determine the credibility of sources (McMullan, 2006). However, those who access health information online tend to have improved self-efficacy and health-related behaviours prior to the intervention (McMullan, 2006), bringing into question the actual impact of e-health information on its own. E-health sites have been shown to be beneficial resources for consumers to learn about health and help initiate the process of behaviour change (Wantland, Portillo, Holzemer, Slaughter, & McGhee, 2004; Samoocha et al., 2010), and increase participation in health care (Samoocha et al., 2010).
2.4.5 Nutri-eSCREEN

Nutri-eSCREEN based on SCREEN (Seniors in the Community Risk Evaluation for Eating and Nutrition), a screening tool for community dwelling older adults, became available online in 2011. This tool presents older adults and caregivers with an accessible forum in which to raise their awareness of potential nutrition issues and provide them with educational materials and knowledge about available services within the community (Keller, 2011). It has been reported that many older adults were not interested in community programs targeted at their needs and expressed an interest in self-management (Keller, 2011). Currently, a formal evaluation has not been done; however, an informal analysis was undertaken in 2012 demonstrating high use and levels of nutrition risk (Keller, 2011; Pandya & Keller, 2012; Keller, 2012).

Since current self-management literature focuses largely on adults with health conditions, the effectiveness of identified self-management programs may not be generalizable to parents accessing health or nutrition information concerning their children. Therefore, studies looking at the effectiveness, such as improvements in knowledge, attitudes, and self-efficacy are needed.

2.4.6 The Role of Parents/Caregivers in Self-Management

Many parents use the internet to assess their children’s health, particularly parents who have children with diagnosed health complications (Tuffrey & Finlay, 2002) and parents with young children (Khoo, Bolt, Babl, Jury, & Goldman, 2008). In a study by Tuffrey & Finlay (2002), 22% percent of parents who attended a pediatric outpatient clinic used the internet to investigate the condition for which they were attending the clinic. However, there are few publications assessing use of the internet for health
information by parents/caregivers (Tuffrey & Finlay, 2002). Furthermore, health information frequently accessed online by parents often lacks credibility and is of poor quality (Impicciatore, Pandolfini, Casella, & Bonati, 1997; Khoo et al., 2008). Khoo et al. (2008) interviewed 360 parents and found that parents often did not have their questions answered adequately on the internet. Parents also suggested that some information was irrelevant, too general, or was extremely difficult to understand (Khoo et al., 2008). A study by Impicciatore et al. (1997), performed a systematic review of two popular search engines on information related to feverish children. They found that a small number of the websites provided complete and accurate information and suggested a need for consistency, accuracy, and completeness when providing information for parents (Impicciatore et al., 1997). Parents are most likely to find health websites using a search engine such as Google with over half considering the reliability of information, typically by evaluating if the content is irrelevant, too general, or confusing (Khoo et al., 2008).

2.5 Knowledge Translation

Knowledge translation (KT) is the means by which knowledge is put into practice in an effort to change behaviours, practice, and policies (Ho, Chockingam, Best, & Walsh, 2003; Straus, Tetroe, & Graham, 2009). The Canadian Institutes of Health Research (CIHR) defines knowledge translation as a dynamic and iterative process that includes three main stages: synthesis, dissemination, and exchange (Straus et al., 2009). Knowledge translation requires an ethically-sound application of health knowledge that will improve health services and/or strengthen the health care system (Straus et al., 2009). Typically, the process of knowledge transfer from research to practice takes considerable time with the result that many health professionals in policy and practice remain unaware
or uninformed about practice-related research (Graham & Tetroe, 2007). This is a common phenomenon known as the “knowledge transfer gap” (Graham & Tetroe, 2007). Therefore, KT provides a means of bridging this gap to ensure that evidence-based knowledge is ‘translated’ from/by the researchers to users and/or practitioners (Graham & Tetroe, 2007).

The intended audience for KT includes all key stakeholders involved in improving health outcomes and the efficiency of health care practices (Graham & Tetroe, 2007). Determining the target group for any KT health program and/or resource is of utmost importance to ensure that those who intend to use the resource find it useful and appropriate (Straus et al., 2009).

2.5.1 Knowledge-to-Action Cycle

The knowledge-to-action cycle has been accepted by CIHR as the model for promoting applied research in the area of knowledge translation. The knowledge-to-action cycle emphasizes the involvement of the end user to ensure that knowledge is relevant to their needs (Graham & Tetroe, 2007; Straus et al., 2009). Straus and colleagues (2009) created a knowledge-to-action cycle that outlines the dynamic and iterative phases involved in KT. The cycle has two main phases, knowledge creation and an action cycle that each have defined steps to successfully complete KT.

Knowledge creation is composed of three separate phases including knowledge inquiry, synthesis, and the creation of a knowledge tool or product (Straus et al., 2009). This cycle helps ensure that knowledge is synthesized and beneficial for the intended target group. Knowledge inquiry includes activities such as primary literature searches
whereas *knowledge synthesis* attempts to find commonalities and patterns. The *knowledge creation* stage involves prioritization of information and looking at the totality of evidence and its quality to ensure that the best quality knowledge is being used (Straus et al., 2009). This effective conceptual model provides a framework of seven distinct phases to ensure steps that are most relevant and effective KT efforts are included (Graham & Tetroe, 2007). The processes aim to identify, review, and select the knowledge that will be implemented and adapt and customize the obtained knowledge in order to fit the specific target group or context. These phases will assess the determinants of how the knowledge will be used and select and tailor the implementation plan that will have evaluative outcomes and strategies to sustain the KT process (Straus et al., 2009). These phases can be applied to self-management programs with the creation piece involving the prioritization of information from literature reviews and looking at the totality of the evidence to ensure the best quality evidence-based information is used in the program (Straus et al., 2009). Further, assessing how the target group understands the tool and information provided can be used to further tailor based on scientific methods of evaluating the users’ interactions with the tool.

### 2.5.2 Knowledge Translation and The Health Belief Model

The Health Belief Model (HBM) is a theory that describes an individual’s knowledge of health problems as well as perceptions regarding their own susceptibilities towards health-related issues, and how this influences motivation for change of health behaviours (Rosenstock, 1974). The HBM provides a framework that can be used to overcome barriers and empower users to make behaviour change efforts (Rosenstock, 1974). The HBM consists of five constructs that predict the likelihood of an individual
engaging in a health program to avoid negative health outcomes (Gerand & Shepard, 2012). The first construct is *perceived susceptibility*, which is understood as the likelihood that an individual experiences a negative outcome of a health-related problem. The second HBM construct is *perceived severity*, which refers to the potential seriousness of the consequences of not performing the suggested health behaviour (Gerand & Shepard, 2012). The third construct is *perceived benefit* that the individual acknowledges advantages to performing a health-related behaviour. Barriers are assessed and understood as the construct of *perceived obstacles* to the adoption of specific changes in behaviour. The last construct, *cue to action*, refers to external pressures including the media and other individuals, in assessing the likelihood of an individual to engage in healthful behaviours (Gerand & Shepard, 2012). The HBM can help to provide the basis of formative work. Further, it can influence the language used to promote behaviour change and increase self-efficacy using constructs outlined in this theoretical framework.

### 2.5.3 Social Cognitive Theory

Social cognitive theory (SCT) describes predictive factors and outcome behaviours in a framework that outlines modifiable factors associated with behaviour change (Richards, Tucker, Brozyna, & Shapiro, 2009). Social cognitive theory incorporates personal, behavioural, and environmental factors, which interact to produce a given behaviour (Bandura, 2004). Although there are many constructs within SCT, the following three variables that influence behaviour are highlighted in health behaviour change and are considered to be modifiable: *perceived value of the behaviour* (influenced by the behaviours of others), *perceived barriers to behaviour change* and, *self-efficacy* (Bandura, 2004). One way that online self-management tools can be evaluated for
effectiveness is by assessing an improvement in self-efficacy, an important construct in health behaviour change; therefore, consideration of SCT in development is likely to ensure that the target groups feel motivated by the wording and messaging throughout.

### 2.5.4 e-Health Literacy

Health literacy is defined as an individual’s ability to obtain, process, and appropriately act on health information (Mackert,, Kahlor, Tyler, & Gustafson, 2009). It is estimated that 7% to 47% of the population in developed countries lack functional literacy skills with the proportions substantially increasing in developing countries (Nutbeam, 2008). Low literacy is related to a variety of poor health outcomes; this is likely due to poor availability of health information and services (Nutbeam, 2008). Literacy is a component that policy-makers and those implementing health programs must be aware of in order to empower and be inclusive of all populations requiring the information (Hemming & Langille, 2006). A study by Hemming & Langille (2006) suggests that both collaboration of researchers and understanding literacy needs of the target population are important to the literacy of e-health models. Evaluation of the literacy of health programs is important when assessing programs and their effectiveness, as well as determining if the health concepts and behaviour change goals are understood (Hemming & Langille, 2006). Slow and simple design of e-health models with the incorporation of relatable visual content has been found to be the most understandable method of relaying online information to a diverse sample of low-literate users (Mackert et al., 2009). Hence, ensuring that online self-management tools are relatable and understandable is key to promote positive health behaviour change within the target group.
2.5.5 Development of Online Self-Management Tools

With any new self-management tool, it is important that it meets its objectives and the needs of the target population and stakeholders. Literature outlining the developmental process to guide future projects for these tools is limited. This may be due to organizations keeping their methods confidential in order to incorporate them into future projects, or to avoid replication, which may make their product less marketable.

We did, however, have the template of Nutri-eSCREEN to guide the development of Nutri-eSTEP. The development of Nutri-eSCREEN® occurred in three phases over seven months (Keller, 2011). The first phase involved an interview process with key informants. The key informants consisted of nutrition professionals, health promotion experts, health communication experts, information technology (IT) professionals, and others knowledgeable about seniors or the delivery of health information online (Keller, 2011). Following the key informant discussions, focus groups with a diverse population of seniors were conducted to ensure there was a desire for the information and to determine any barriers or considerations that had to be taken into account (Keller, 2011). Lastly, usability interviews were done with older adults to ensure the pilot platform of Nutri-eSCREEN® was appropriate and acceptable to use for the target audience (Keller, 2011).

Development of an online health management tool requires evaluation of the development process. These methods are discussed in the subsequent sections.
2.6 Usability Methodology

Usability analysis has most frequently been used in the literature to identify problems and to rectify issues in surveys and online technologies (Beatty & Willis, 2007; Jaspers, 2009). Usability analyses help to overcome many disadvantages of pretesting surveys that typically only take researchers' suggestions into account (Presser et al., 2004). Thus, usability testing allows target users to identify any problems or issues that arise while using the tool to the researcher, rather than the researcher suggesting the problem and finding out whether it is relevant (Presser et al., 2004). Although a single definition has not currently been widely accepted, usability can be defined as administering a draft survey or pilot tool to participants while collecting their responses, when evaluated, can help determine if the participants understood the survey and/or identified any issues with its completion (Beatty & Willis, 2007; Drennan, 2003).

Performing usability studies with diverse populations can also help ensure that feedback from those with various levels of computer and information or health literacy is obtained (Mackert, Kahlor, Tyler, & Gustafson, 2009). Willis (1999) suggest that sample sizes are typically small, providing an example with nine participants. However, small sample sizes may not be insufficient and may not reach saturation leaving problems unidentified. Larger sample sizes can measure the reach and diversity of populations ensuring that many, if not all, issues and their significance is clearly identified (Blair & Conrad, 2011). Usability techniques can be applied to health applications such as online health management tools or surveys to ensure adequate design, limited complications, and ease of use (Jaspers, 2009).
There are three specific methods of usability that are often applied to health technologies. These include heuristic evaluation, cognitive walkthroughs, and the ‘think aloud’ method (Jaspers, 2009).

### 2.6.1 Heuristics

Heuristic evaluation is a usability method typically completed by experts within the field. Experts look at specific and common principles of the system or survey and determine if the functions are satisfactory. Jaspers (2009) identifies requirements involved in a heuristic evaluation. They are as follows: a) use of simple and natural language; b) employment of user’s first language; c) provision of feedback; d) consistency; e) minimization of memory load; f) provision of clearly marked exits; g) provision of proper error messages; h) provision of shortcuts; i) error prevention; and, j) provision of help and documentation (Jaspers, 2009). Heuristic evaluation is relatively efficient with a high benefit to cost ratio. However, heuristic evaluation requires high skills and experience from the evaluators in order to get reliable results (Jaspers, 2009). Further, heuristic evaluation does not evaluate the target users ability to use the tool.

### 2.6.2 Cognitive Walkthrough

The cognitive walkthrough method is more structured than heuristic evaluation but similar in that it is carried out by experts (Jaspers, 2009). Cognitive walkthroughs involve a strong focus on the learnability of the application being studied. Typically, users are selected to be involved in the process that is being evaluated by the expert. The users set a goal for the application, inspect the available actions (the menu items, buttons, etc.) and select the button that seems to allow them to move toward the goal. Lastly, the user continues to perform actions and evaluate the system until they have reached the
overall goal. During this process, the evaluator watches to see if the user will achieve the proper goal, will associate actions with the intended effect, will notice if correct actions are available, and if the user noticed that progress was being made to the overall goal. However, this all depends on whether the user is able to accurately determine the desired outcome (Jaspers, 2009). This method has been shown to only reveal a third of usability issues and can often limit the number of problems found. Additionally, this method only notices what the experts evaluate which is typically achieving the overall purpose of the system but may not evaluate all available functions (Jaspers, 2009).

2.6.3 Cognitive Interview & Think Aloud Technique

The cognitive interviewing method stems from cognitive psychology (Jaspers, 2009), and involves one of two techniques: verbal probing and the think aloud method (Chaney, Barry, Chaney, Stellefson, & Webb, 2013). ‘Think Aloud’ is a very direct method that provides deep understanding into the problems that users encounter while interacting with systems (Jaspers, 2009). Think Aloud data analysis is extensive and requires high expertise. However, Beatty & Willis (2007) state that advantages to the ‘think aloud’ method are: limited interviewer-imposed bias; minimal interviewer training; and, an open-ended format.

Data are collected by instructing participants to solve problems while stating their thoughts and/or processes being followed (Beatty & Willis, 2007; Jaspers, 2009). The analysis of data is done by reviewing transcripts or notes taken throughout the interview (Beatty & Willis, 2007). Research by Beatty & Willis (2007) identify that using probing with questions can also identify reporting errors and can ease the awkward and burdensome outcome of strictly using the ‘Think Aloud’ technique. An example of this
may be if the participant indicates very little out loud and insufficient data are collected on their thoughts. The incorporation of previously defined questions ensures adequate data are collected. Although probing can also yield similar results to ‘think aloud’, it may create more interference in the interview (Beatty & Willis, 2007), and at the same time can be useful in assessing comprehension problems, further issues not discussed, and responses that are inadequate or need further clarification (Conrad, Blair, & Tracy, 2000).

2.7 Conclusion

In conclusion, in order to develop an online self-management tool using NutriSTEP® questionnaires, a specific framework that includes key methods described above must be employed. Creating a self-management tool involves the inclusion of all key stakeholders, including the target population as well as formative evaluations assessing barriers, needs, and accessibility. Health behaviour change theories must also be incorporated to influence behaviour change of the target population. Usability trials must also be completed to ensure appropriateness and functionality of the final product. Further, a knowledge translation process must be followed in order to ensure successful dissemination of evidence-based research to the target group.
3.1 Rationale & Summary

The development of Nutri-eSTEP aims to translate nutrition information in order to increase the accessibility of ethical nutrition screening for young children and provide customized guidance aimed at parents to promote behaviour change. Currently, NutriSTEP® is primarily accessed from an HSP such as: health professionals; Family Health Teams; physicians; some school boards; provincial programs (e.g., New Brunswick); and, Public Health Units. At this time, individualized guidance to support behaviour change does not occur unless clients self-identify to a HSP or attend a referral. NutriSTEP® is a viable self-assessment tool, providing ethical screening that promotes earlier identification and motivation to seek out nutrition education and resources that promote behaviour change (Keller, Haresign, & Brockest, 2007).

Currently, an ethical screening process takes place for NutriSTEP® in which an HSP refers parents to credible resources for follow up post nutrition risk screening. Previous research has demonstrated that referral participation is approximately 20% and that parents would like information to be accessible to them without having to attend a referral (Rysdale et al., 2011; Watson-Jarvis, McNeil, Fenton, & Campbell, 2011). Many who are screened are not ready for available services and would prefer self-management through internet/e-screening (Rysdale et al., 2011). Nutri-eSTEP will allow parents to access the information and resources they want at their own pace.

The NutriSTEP® website without the licensed questionnaire has received over 77,000 hits since it was launched (Haresign, personal communication, 2012). The
Dietitians of Canada (DC) website, a credible nutrition information website for the public, which will house the Nutri-eSTEP screening tool, receives over 77000 hits per day (Heresign, personal communication, 2012). Placing Nutri-eSTEP on the DC website for credible nutrition information will allow increased accessibility of the tool across Canada.

3.2 Research Objective

Since the development of the original NutriSTEP® paper-based questionnaire, there has been an expressed need for the tool to be adapted to an online setting in both English and French. The objective of this research was to create an online adaptation, Nutri-eSTEP, from the NutriSTEP® screening tools for parents of preschoolers and toddlers, with accompanying feedback and links to resources. Nutri-eSTEP is hosted on the Dietitians of Canada website.

Nutri-eSTEP will serve as a knowledge translation (KT) vehicle to raise parental awareness of their children’s nutritional needs while providing resources to support self-management. The KT framework will be employed by utilizing parental input, identifying the barriers and needs, tailoring the tool, evaluating, and monitoring it. Nutri-eSTEP will provide a forum that is acceptable and satisfactory for parents to gain knowledge on their children’s nutritional needs. Ethical screening will occur by the creation of messages that address identified risk areas by linking to credible provincial resources and by providing the opportunity for referral or to call a dietitian, if the service is available provincially. Social cognitive theory and HBM have been used in the creation
of messaging and the layout to motivate parents to complete positive health behaviour changes.

A parent advisory group will evaluate each step of the Nutri-eSTEP development process to ensure acceptability, necessity, and usefulness of information provided to parents. This will ensure that Nutri-eSTEP is satisfactory for the end user and provides adequate information that is understandable and helpful in providing important nutrition information.
3.3 References


Research, 6(4).


CHAPTER 4

4.1 Methods

Nutri-eSTEP was created using data from the following sources:

1. Scientific Literature
2. Parent Advisors
3. National Advisors (Experts in Pediatric Nutrition)
4. NutriSTEP® Team

4.1.2 Overall Procedures

This study was a multi-phase project involving parents/caregivers of preschoolers and toddlers, pediatric nutrition experts from across Canada, Dietitians of Canada, and members of the NutriSTEP® research team. The study design for the project is shown in Table 1.0. It included four major steps: key informant interviews, the creation of feedback messages, the creation of mock websites, and the review of the websites.

All studies outlined in this project were reviewed and received ethics clearance through the University of Guelph Research Ethics Board (Appendix A).
### Table 1.0: Study Design for Nutri-eSTEP

<table>
<thead>
<tr>
<th>Development Plan for Nutri-eSTEP</th>
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</thead>
<tbody>
<tr>
<td>Key Informant Interviews</td>
</tr>
<tr>
<td>(September/October 2012)</td>
</tr>
<tr>
<td>Creation of Feedback Messages</td>
</tr>
<tr>
<td>(Creation: October/November</td>
</tr>
<tr>
<td>Review: December 2012/January 2013)</td>
</tr>
<tr>
<td>Creation of Mock Website</td>
</tr>
<tr>
<td>(December 2012/January 2013)</td>
</tr>
<tr>
<td>Review of the Mock Websites</td>
</tr>
<tr>
<td>(February – June 2013)</td>
</tr>
</tbody>
</table>

- • Scripted interviews to provide insight on development*
- • Messages drafted*
- • Messages reviewed*
- • Messages revised*
- • Review of Nutri-eSCREEN
- • Building of the pilot websites (draft versions)**
- • Usability testing**
- • Survey to determine crucial changes**
- • Revisions to website
- • Finalization of websites

*Both preschool and toddler websites

**Preschool website only

### 4.1.3 Participants

This project involved several distinct groups of participants who were either involved with the coordination of Nutri-eSTEP or who participated as volunteers in the project. These groups are described in Table 2.0.
<table>
<thead>
<tr>
<th>Management</th>
<th>Participants</th>
<th>Role</th>
<th>Recruitment</th>
<th>Incentive</th>
</tr>
</thead>
</table>
| **Nutri-eSTEP team** | • Principal Investigator (JRS)  
• Consultant (LR)  
• Two members of Dietitians Canada (HH & CM)  
• Graduate Student (MR) | • Leading all stages of research and development | • Established | • N/A |
| **NutriSTEP® team** | • Academic researchers (JRS & HK)  
• Consultant (LR)  
• Public Health Nutritionist (JB) | • Submits grants  
• Makes decisions on research focus | • Established  
• Existed for over 10 years | • N/A |
| **Message Developers** | • Registered dietitian (AO)  
• Senior Nutrition Student (HAS) | • Developed draft versions of the feedback messages for the toddler and preschool websites | • Hired | • N/A |
| **Dietitians of Canada Information Technology Department** | | • Created website as directed by the Nutri-eSTEP team | • Employed at Dietitians of Canada | • Contract developed between University of Guelph and Dietitians of Canada |
| **Professional Translator & Francophone Registered Dietitians** | • Hired professional translator  
• Reviewed by a 2 francophone registered dietitian (RD) with previous NutriSTEP® experience and an Eat Right Ontario (ERO) RD | • Translate feedback messages to French | • Professional translator contracted  
• Registered Dietitians assigned task by DC | • Contract for professional translator  
• $300 incentive for NutriSTEP® RDs |
| **Graduate and Undergraduate Research Assistants** | | • Assisted with the usability and reliability testing | • Hired | • N/A |
| Volunteers | Parent Advisors | • Phases are outlined in Appendix B | • Recruited through posters, ads, by invitation, and snowball sampling  
• Posters were put up at daycare centers, Ontario Early Year Centres, throughout Southern Ontario  
• Parent advisors were recruited from Southern Ontario and Sudbury  
• **Eligibility criteria:** included having a child that fit into the preschooler (3-5 years old) or toddler (18 – 35 months) age range  
• It was required that parent advisors read and understand English with a high school education or higher  
• Parents must have planned to stay in the area for an 8-month period and be able to give at least an hour of time on five separate occasions | • $100 honorarium for each phase of participation, for a total of up to $500 (for participating in all five phases) |
### National Advisory Committee (NAC)
- Review and provide feedback on the mock and final website
- Review and provide feedback on parent messages as well as relevant resources and links
- Support evaluation indicators and links
- Participate in teleconferences
- Those with pediatric nutrition expertise as well as knowledge of NutriSTEP® were contacted to participate by the consultant
- Provided $100 honorarium to acknowledge experience and contribution for participation in meetings and reviewing/providing feedback on documents in a timely manner

### Parents of Preschoolers and Toddlers
- Complete usability testing
- Augmented parent advisor group based on the suggestion that sample sizes larger than 8-12 measure reach and diversity of populations better (Blair, 2007 & Willis, 1999)
- Recruited from previous study in Ontario Early Years Centres and from convenience sampling and word of mouth
- $40 grocery gift certificate

## 4.2 Procedures
Since each phase of the website development happened concurrently with many others; a timeline of the order in which each phase took place is shown in Table 1.0. However, for the sake of organization, the phases are separated into main categories within the methods and procedures section of this proposal.
4.2.1 Development of Feedback Messages

Feedback messages were drafted based on the response to each NutriSTEP® question. Since the original NutriSTEP® can be dichotomized to a response of “What is Going Well” (no risk) and “What to Work On” (risk), messages were created for each type of response. Furthermore, based on Nutri-eSCREEN®, the website planned to feature a “Learn More” option for each question to provide more in-depth information.

Messages were drafted by two research assistants (HAS & AO), one a RD (AO) based on a literature search of scientific literature, government publications, and Dietitians of Canada publications. Both electronic and paper resources were used. Searches conducted identified literature and resources on the attributes of nutrition risk identified within the NutriSTEP® questionnaires (i.e., food and fluid intake, physical activity, physical growth, feeding relationship, and factors affecting food intake, and development for the Toddler version). Messages were drafted to an appropriate readability level and were later tested by the Parent Advisors (PAs) to ensure readability.

Messages were first reviewed first by the Nutri-eSTEP team, by the National Advisory Committee, and subsequently reviewed by the Parent Advisors. The process of the review is described below.

The National Advisory Committee (NAC) reviewed the messages for both the preschooler and toddler websites separately. Half of the NAC participated in the preschooler review, with the remaining half participating in the toddler review. Comments from the NAC were integrated into one large document and were discussed via a telephone conference call with the Nutri-eSTEP team and the NAC members. The
goal of the conference call was to go over the concerns and suggestions and obtain overall consensus of the content. The Parent Advisors subsequently reviewed the feedback messages that were revised after the conference call with the NAC.

A booklet was created by the Nutri-eSTEP team for Parent Advisors to easily view the messages and insert their comments and feedback without having to flip through multiple pages. Each section of the messages easily fit onto one page to minimize the burden on Parent Advisors to complete this phase. Once the messages were reviewed by each Parent Advisor, a research assistant picked it up and reviewed the content with the parents to ensure understanding of their suggestions. An example of the guide is provided in Appendix C. The booklet aimed to: a) gain parental input and satisfaction on content provided; b) ensure that key messages were readable to the end-users; and, c) determine if parents required any further information to fulfill knowledge gaps or enact behaviour change as a result of completing Nutri-eSTEP.

Half of the Parent Advisor group had preschoolers and participated in the review of the preschool messages. The remaining half of the Parent Advisors had toddlers and participated in the review of the toddler messages.

The comments on messages and suggested changes by parent advisors were reviewed by the Nutri-eSTEP team and were modified as appropriate. The updated messages were then redistributed to the NAC members and consensus was again reached on the content.
4.2.2 Parent Advisor (Key Informant) Interviews

An interview with each of the Parent Advisors (n=11) was completed using a scripted interview (Appendix D). The purpose of these interviews was to determine if nutrition screening was something parents of preschoolers and toddlers thought helpful, to find out what websites parents currently use to access health information about their children, and to determine if there were any concerns or barriers that would prevent parents from using a site such as Nutri-eSTEP. This interview involved going over Nutri-eSCREEN® and asking questions about the online screening tool for seniors to determine what changes should be made for an online screening tool for preschoolers and toddlers. The graduate student who was part of the Nutri-eSTEP team performed each interview with the Parent Advisors. Suggestions from the interviews were noted and carried forward to the development of the pilot website.

4.2.3 Development of Nutri-eSTEP

The preschooeler English version of the website was developed first and reviewed by the Nutri-eSTEP team before testing was carried out with the Parent Advisors as a means of filtering out any obvious errors or omissions. The other versions of the website (i.e., toddler version and both the preschooeler and toddler French versions) were reviewed subsequent to the preschooeler version as the functionality of each website was essentially identical, differing in content only.

4.2.4 Images

Images were chosen by the Nutri-eSTEP team and choices revised based on parents suggestions throughout the review process. Images were chosen that had children
of an appropriate age range reflecting the concept of each question where an image was used.

**4.2.5 Review of Website**

Usability testing was conducted on the English preschool version of Nutri-eSTEP. A semi-scripted interview script was used for research assistants to follow (Appendix E). Thoughts and impressions of the content and layout of the website were gathered as well as any navigational issues that were mentioned or that the research assistant noted throughout the interview. The purpose of usability testing was to: a) identify what users liked about the Nutri-eSTEP mock website; b) identify where users struggled with functionality of the mock website; and, c) and, identify terminology that was preferred by users (e.g., is the language motivating).

Training was completed with all of the research assistants to ensure consistency among results. Informed written consent was received and participants completed a confidential demographic form. Contact information was collected where applicable. Parents were then directed to the website and told they could complete the questionnaire one page at a time with questions for each page to follow before moving forward. The purpose of testing the website was to determine what parents liked and did not like, what made sense, and what was not clear. The interviewer used the ‘think aloud’ method of interviewing. As participants worked through the website, they were asked to describe their actions by verbalizing what they were doing. (e.g., I’m going to click the ‘Start Here’ button at the bottom of the screen). Research assistants wrote down what the participants said, as well as their behaviours, how they interacted with the website (e.g.,
what links they clicked on and when), and if any hazard questions (e.g., an automated message stating a question has not been answered) came up. Research assistants were also provided with alternative questions to prompt the participants to ensure that any usability concerns were noted. Research assistants were reminded not to jump in and help the participants. If the participant asked the research assistant a question, the research assistants were trained to ask “What do you think?” or “I am interested in what you would do”. Some participants had limited computer use and did need to be shown the basics of mousing and keyboarding.

Members of the Nutri-eSTEP team completed the analysis of the usability data. All information collected was entered into a single document to conduct a content analysis and brought to the attention of the entire team to ensure changes were made appropriately.

4.2.6 Finalization of Website

Members of the Nutri-eSTEP team continued to analyze the website looking for any further errors or disabled links that would prevent seamless use. Heuristic evaluation was also done with the Nutri-eSTEP team and the NAC to ensure that any errors or mistakes were noted and rectified.

A survey was created by the Nutri-eSTEP team using SurveyMonkey. Parent Advisors provided an analysis of the website indicating all the problems and issues parents identified from the usability phase to determine if the changes were rated as important by parents. The survey questions are provided in Appendix F.
Once all changes were made to the website, a further survey was created by the Nutri-eSTEP team using SurveyMonkey that was sent to Parent Advisors to determine their overall satisfaction with the Toddler website. The survey questions are provided in Appendix G.

Both the preschooler and toddler messages and website were translated into French by a professional translator. The Nutri-eSTEP team was responsible for the translation of the messages and Dietitians of Canada was responsible for the translation of the website contents. Translations of the messages were reviewed by three francophone Parent Advisors as well as three RD’s; review of the other website content was by an Eat Right Ontario RD.
CHAPTER 5

Developing an online nutrition self-management tool: Nutri-eSTEP

5.1 Introduction

As nutritional problems in children, particularly obesity, continue to increase in Canada (Shields, 2005), there is a need to provide accessible nutrition screening and support that promotes health behaviour change (Keller, Brockest, Haresign, 2007). Nutrition screening is defined as the identification of risk factors leading to poor nutritional status (American Dietetic Association, 1994). Currently, there are valid and reliable nutrition risk screening questionnaires for toddlers (Toddler NutriSTEP®) (Randall Simpson, 2014) and preschoolers (NutriSTEP®) (Randall Simpson, Keller, Rysdale, Byers, 2008). The 17-item NutriSTEP® questionnaires are valid and reliable and are designed for completion by parents/caregivers of community-living preschoolers and toddlers (Randall Simpson, Keller, Rysdale, & Byers, 2008; Randall Simpson, EB Abstract). To date, administration of NutriSTEP® has been limited to paper copies, typically implemented by health service providers (HSPs), public health units, and researchers (Persaud et al., 2013; Watson-Jarvis, McNeil, Fenton, & Campbell, 2011a; Watson-Jarvis, Fenton, McNeil, & Campbell, 2011b). Since the development of the original paper NutriSTEP® questionnaires, there has been an expressed need for adaption to an internet setting (Randall Simpson, 2014).

Nutrition screening can be completed at any time, as long as the screening process fits ethical guidelines and benefits the target population (Keller et al., 2007). Since ethical
screening requires appropriate resources, referrals, and potential for follow up (Rush, 1997), self-management tools that are supported with credible, detailed, and relevant feedback provides a viable opportunity for nutrition screening (Keller, Haresign, & Brockest, 2007). Self-management, a form of preventative health care for learning behaviour change techniques that control, reduce, or prevent chronic illness (Lorig & Holman, 2003), that includes screening to raise awareness has the potential to improve the reach of information currently provided by health service providers (Southgate, Keller, Reimer, 2010). E-health self-management sites have been shown to be beneficial for learning about health and for initiating the behaviour change process (Wantland et al., 2004; Samoocha et al. 2010), as well as increasing participation in health care (Samoocha et al., 2010).

The overall goal of this project was to adapt the NutriSTEP® questionnaires for internet use. A Canadian-developed nutrition screening tool for community-dwelling older adults, SCREEN (Keller, Goy, Kane, 2005), preceded the development of NutriSTEP® and an online version of SCREEN (Nutri-eSCREEN®) (www.nutritiosscreen.ca) hosted on the Dietitians of Canada (DC) website (Keller & Haresign, 2013; Keller, Haresign, Wham, & Watson, 2012). The online versions, Nutri-eSTEP, are hosted on the Dietitians of Canada (DC) website in both English and French (www.nutritionscreen.ca) and provide a platform with credible feedback and resources for parents to self-manage their children’s nutrition behaviours.
The objective of this paper is to describe the process for the development of the online adaptation of the NutriSTEP® questionnaires, with accompanying feedback and links to resources.

5.2 Methods

This was a multi-phase, iterative project to develop an internet version of the NutriSTEP® questionnaires. Nutri-eSTEP shares an online platform with Nutri-eSCREEN®. As with Nutri-eSCREEN®, Nutri-eSTEP not only provides the forum for nutrition screening, but parents/caregivers receive feedback messaging based on their responses to each question and links to trusted and credible resources.

5.2.1 Participants:

This project was guided by the Nutri-eSTEP Research Team (JRS, LR, JB, HH, MR, HK) and consisted of academics, members of DC, a consultant, and a graduate research assistant. Ethics approval was from the University of Guelph Research Ethics Board (Appendix A). Parents/caregivers provided informed written consent prior to participation.

A group of Parent Advisors (PA) were purposively recruited based on their child’s age with the goal of recruiting different ethnic and cultural backgrounds with differing socio-economic statuses to ensure that our tool was usable and adequate for all English and French speaking Canadians. Recruitment was done through word of mouth, advertisements, and snowball sampling. Parent Advisors were expected to contribute in all phases and received a $100 honorarium for each phase of participation for a maximum total of $500.
Additional Parent Volunteers (PV) were recruited to increase the sample size of parents for usability testing of Nutri-eSTEP; these parents were recruited through Ontario Early Years Centres, and by word of mouth.

A National Advisory Committee (NAC) committee was established; this group was purposefully selected from across Canada, based on their extensive experience in pediatric nutrition or public health, and having had prior experience with NutriSTEP®.

The objectives of each phase are outlined in Table 3.0.
Table 3.0: Overview of methods in the multiphase design of the iterative process used in developing the online Nutri-eSTEP

<table>
<thead>
<tr>
<th>Phase</th>
<th>Methods</th>
<th>Purpose &amp; Objectives</th>
</tr>
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</table>
| One   | Key informant interviews with Parent Advisors | End-users impressions and thoughts on creating an online self-management tool were collected through semi-scripted interviews. These were used to guide the development of the draft website. Objectives were:  
  • to determine if parents felt that the idea of online screening was important or useful  
  • to show parents Nutri-eSCREEN® and to gather their opinions on the layout and how they would change it for parents of young children  
  • to determine parents’ preferences regarding layout, font, format, display of information, and graphics for Nutri-eSTEP  
  • to develop a mock website based on key informant information |
| Two   | Development and review of feedback messages | Feedback messages were drafted by a registered dietitian and a senior nutrition student and reviewed by a nationally representative advisory committee of health professionals and by Parent Advisors. Objectives were:  
  • to ensure accuracy and agreement of information with pediatric health experts, registered dietitians, and health professionals  
  • to determine if the content for the messages were appropriate for parents in terms of readability, length, and motivating behaviour change |
Three  
<table>
<thead>
<tr>
<th>a) Website Development</th>
<th>The mock Nutri-eSTEP website for preschoolers was developed for testing. Usability testing on the mock website was completed by Parent Advisors and Parent Volunteers.</th>
</tr>
</thead>
<tbody>
<tr>
<td>b) Usability Testing</td>
<td>Objectives were:</td>
</tr>
<tr>
<td></td>
<td>• to develop the mock website and ensure functionality of the data collection feature</td>
</tr>
<tr>
<td></td>
<td>• to identify any issues with functionality, wording, and design from parents</td>
</tr>
<tr>
<td></td>
<td>• to determine appropriate changes to finalize the website</td>
</tr>
</tbody>
</table>

Four  
<table>
<thead>
<tr>
<th>Survey to determine importance of changes</th>
<th>A survey was completed by Parent Advisors to determine the most important recommended changes needed to the website be incorporated.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Objectives were:</td>
</tr>
<tr>
<td></td>
<td>• to determine what changes were key to parents’ satisfaction with the website</td>
</tr>
<tr>
<td></td>
<td>• to determine which suggested changes were more of a personal preference and not as relevant for modification</td>
</tr>
</tbody>
</table>

Five  
<table>
<thead>
<tr>
<th>Review of Toddler Nutri-eSTEP and satisfaction of final product</th>
<th>A survey of Parent Advisors was conducted to review the final Toddler Nutri-eSTEP and to rate their satisfaction and impressions of the final product</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Objectives were:</td>
</tr>
<tr>
<td></td>
<td>• to review the toddler website, links, and provincial resources</td>
</tr>
<tr>
<td></td>
<td>• to determine overall satisfaction of the Nutri-eSTEP tool among Parent Advisors</td>
</tr>
<tr>
<td>Month</td>
<td>Finalization and translation of website</td>
</tr>
<tr>
<td>-------</td>
<td>----------------------------------------</td>
</tr>
</tbody>
</table>

**Objectives were:**

- to do a comprehensive heuristic evaluation of the website and its functions to ensure all information and content was appropriately placed throughout the website
- to ensure there were no issues with the functionality

### 5.3 Procedures

Nutri-eSTEP was developed by utilizing parental input, identifying the barriers and needs, determining the usability, tailoring the tool, and evaluating the final product. The principles of ethical screening were followed by the creation of feedback messages, identification of provincial resources, and information for referral or to call a registered dietitian for follow-up. A Parent Advisory group evaluated each step of the Nutri-eSTEP development process to ensure acceptability, necessity, and usefulness of information. This ensured that Nutri-eSTEP was satisfactory for the end user and provided adequate, understandable and helpful nutrition information to the target audience.

#### 5.3.1 Phase One: Key Informant Interviews

Parent Advisors were asked to review Nutri-eSCREEN®, prior to a semi-scripted one hour interview with a trained research assistant. The script, modified from key intercept interviews completed for Nutri-eSCREEN®, was developed to guide the interview process. Parent Advisors were asked probing questions on: the necessity for a web-based tool to provide nutrition information to parents regarding their preschoolers and toddlers; where they currently obtained nutrition information; and, other questions related to design of the website (e.g., colour scheme, layout, font, images, etc.).
Responses were recorded by the research assistant and transcribed. Content analysis, the summarization of qualitative data into patterns or themes related to the research question, (Harris et al., 2009) was completed to guide the development process.

5.3.2 Phase Two: Development and Review of Feedback Messages

Feedback messages were written by a registered dietitian and a senior nutrition student based on scientific literature and current public health publications and each NutriSTEP® question was dichotomized (Randall Simpson et al., 2008) to provide succinct feedback on ‘What’s Going Well’ (no risk) and ‘What to Work On’ (risk), with an additional “Learn More” section (as for Nutri-eSCREEN®) with more comprehensive information rather than providing a nutrition risk score, as currently done with the paper-and-pencil NutriSTEP®. Providing feedback based on responses to the questionnaires fits into the ethical screening model by providing appropriate resources, referrals, and the potential to follow up (Keller, Brocket, Haresign, 2007). Feedback messages were also based on behaviour change theories, specifically social cognitive theory and the health belief model.

The NAC reviewed the feedback messages and provided evidence-based suggestions and revisions, as well as links to province-specific resources. The NAC members reviewed either the preschooler or the toddler feedback messages via e-mail. Written comments were transcribed into a single document and the Nutri-eSTEP team reviewed this feedback. Conference calls with the NAC took place separately for each of the toddler and preschooler sets of feedback messages with the Nutri-eSTEP team to obtain consensus on changes, modifications, deletions, and additions to the feedback.
messages. Based on this consensus, changes were then made by the Nutri-eSTEP team to finalize this stage of the message review.

The feedback messages were then sent to Parent Advisors for review to ensure that the information had good readability for our target audience and that the information was useful. Parent Advisors reviewed either the preschooler or toddler feedback messages depending on the age of their children. Parent Advisors assessed the length, the appropriateness of content, and the clarity of the messages. They provided written feedback to specific questions posed regarding the messages and also further suggestions and open-ended feedback. Once the Parent Advisors had completed the review, they met individually with a member of the Nutri-eSTEP research team to review their comments to ensure that all of their thoughts were captured and that the team had a complete understanding of their reviews. The Nutri-eSTEP team then transcribed the comments into a single document and completed content analysis to understand reoccurring or key changes and comments that Parent Advisors suggested; messages were finalized based on this feedback. The messages were subsequently translated into French by a professional translator and then reviewed by three Francophone registered dietitians and three Francophone Parent Advisors.

5.3.3 Phase Three: Website Development and Usability Testing

Informed by the feedback from phase one, a mock website was developed following the format of Nutri-eSCREEN using the suggestions for colour, design, and layout from the Parent Advisors. Appropriate images were assembled and reviewed by the Nutri-eSTEP team. The pilot website was created for the preschool age group, as
layout and functionality between the preschooler and toddler versions are identical with the content of feedback messages and questions being the key differences.

Usability testing was conducted on the preschool version of Nutri-eSTEP using cognitive interviewing. Cognitive interviewing includes both verbal probing and the ‘think aloud’ method (Chaney et al., 2013). The ‘think aloud’ method is when participants are encouraged to verbalize their thoughts and reactions as they go through the website and experience its functionality (Beatty & Willis, 2007). Parent Volunteers and Parent Advisors were asked to ‘think aloud’ as they went through the pilot website and then were prompted with scripted questions to further identify: a) what they liked about Nutri-eSTEP; b) where they struggled with functionality; and, c) terminology that was preferred (e.g., is the wording clear?). Usability testing was done one-on-one with a trained research assistant and took approximately one hour to complete. Notes were made throughout the interview. Content analysis of the responses was completed to inform necessary changes to the Nutri-eSTEP pilot platform.

5.3.4 Phase Four: Survey to Determine Importance of Non-crucial Revisions

Parent Advisors participated in an online survey via SurveyMonkey®. The survey (23 questions) used a four-point scale, ranging from ‘important’ to ‘not important’, to determine the necessity of potential changes identified in the usability phase of the project for the preschool version. Parents were given two weeks, at their own convenience, to complete the survey on paper and then input answers online survey so that they could view the website while answering. Parent Advisors could notify the research assistants with any questions regarding the completion of the survey. Since some
suggestions indicated by parents in Phase 3, were perceived to be more personal preference, it was important to determine if these changes were necessary.

5.3.5 Phase Five: Review of Toddler Website and Satisfaction Survey of Final Website

A second online survey (SurveyMonkey®), asked Parent Advisors to review the Toddler website as well as the links and resources provided. Parent Advisors were able to comment on each page of the website by answering questions and making comments. Parent Advisors were prompted to comment on things that they liked or would change while moving through each page of the website. A satisfaction question, using a four-point rating scale was provided at the end of the survey with an option for parents to expand on their evaluation. Parent Advisors were provided with a written PDF of the survey so that they could view the survey while also viewing Nutri-eSTEP online.

5.3.6 Phase Six: Finalization of Website

The Nutri-eSTEP team completed a heuristic evaluation of the websites to identify any further errors or disabled links that would prevent seamless use. This included research assistants going through the website and selecting all ‘What’s Going Well’ answers, subsequently doing the same process for “What to Work On”, to ensure that all messages appeared appropriately. Any changes were reported to the design team who made the necessary adjustments before Nutri-eSTEP was released for the public.

5.4 Results

This study used an iterative process to complete the development of Nutri-eSTEP, and results are presented as such.
5.4.1 Participants:

Parent Advisors were parents of toddlers (36%, n=4) or preschoolers (64%, n=7).

For the usability study, the preschooler site was tested with mainly parents of preschoolers (79%, n=15), and some parents of toddlers (n=4; 21%).

Characteristics of parent participants are shown in Table 4.0.
Table 4.0: Demographic Characteristics of Parent Participants in the Development of Nutri-eSTEP

<table>
<thead>
<tr>
<th>Parent Characteristic</th>
<th>Parent Advisors (n=11)</th>
<th>Parent Volunteers &amp; Parent Advisors (Usability Study) (n=19)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respondent age (years)</td>
<td>31 ± 5</td>
<td>34 ± 7</td>
</tr>
<tr>
<td>Number in household</td>
<td>4 ± 1</td>
<td>4 ± 1</td>
</tr>
<tr>
<td>Number of children</td>
<td>2 ± 0</td>
<td>2 ± 1</td>
</tr>
<tr>
<td>% (n)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>100 (11)</td>
<td>100 (19)</td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>73 (8)</td>
<td>79 (15)</td>
</tr>
<tr>
<td>Separated/Widowed/Divorced</td>
<td>27 (3)</td>
<td>21 (4)</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some/Graduated High School</td>
<td>9 (1)</td>
<td>16 (3)</td>
</tr>
<tr>
<td>Some College/University</td>
<td>18 (2)</td>
<td>21 (4)</td>
</tr>
<tr>
<td>Graduated College/University</td>
<td>73 (8)</td>
<td>63 (12)</td>
</tr>
<tr>
<td>Income</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$0 - $59,999</td>
<td>46 (5)</td>
<td>32 (6)</td>
</tr>
<tr>
<td>$60,000-$89,999</td>
<td>27 (3)</td>
<td>21 (4)</td>
</tr>
<tr>
<td>$90 000+</td>
<td>27 (3)</td>
<td>31 (6)</td>
</tr>
<tr>
<td>Don’t know</td>
<td>0 (0)</td>
<td>16 (3)</td>
</tr>
</tbody>
</table>
The NAC, (n=7), consisted of health professionals from across Canada (two from British Columbia, two from Alberta, one from Ontario, one from Quebec, and one from New Brunswick). Six members were registered dietitians and one was a registered nurse. Three of the NAC members were senior administrators at the provincial government level, with most involved in public health and one involved in academia.

5.4.2 Phase One: Key Informant Interviews

All Parent Advisors completed the semi-scripted interview and their responses were transcribed and reviewed. When asked, all Parent Advisors felt that a nutrition screening website with self-management components would be useful and beneficial for parents of young children. They noted key considerations for changes that would gear the website to the target group. Common suggestions were the inclusion of pictures and colours that would be inviting for all demographics. One Parent Advisor indicated that “visuals can help explain [the question]” (PA07). Another stated that the new website needed to be “more lively [than Nutri-eSCREEN], especially if it’s for kids. Needs brighter colours and colours and to look more inviting” (P10). Parents wanted nutrition messages to be clear and written in a way that would motivate behaviour change without
imparting judgment. For example, it was suggested “I would not indicate specific problems [a child may have] because parents will get very concerned” (PA08). Similarly, another parent suggested we communicate awareness of potential problems in “simple, non-threatening, non-aggressive terms. Use positive messages and make sure they know there is support” (PA03).

Parent Advisors also indicated time to be a factor in their lives, advocating for a product that was quick and straightforward with clear benefits from completing the questionnaire. When asked if they had any concerns about nutrition screening, a Parent Advisor stated that it “has to have purpose of benefitting the survey completer. Must be comprehensive and specific and able to provide good information. I don’t want it to waste people’s time” (PA11).

The results were used by the Nutri-eSTEP and the design team to guide the development of the pilot website.

5.4.3 Phase Two: Creation and Review of Feedback Messages

Feedback messages were developed by a registered dietitian and a senior nutrition student based on the risk categories and issues identified by the NutriSTEP® research team; messages were then reviewed and revised by the Nutri-eSTEP team. The feedback messages were next reviewed by the NAC to ensure accurate and reliable content; two conference calls with members for each age group were held to discuss potential revisions suggested by NAC members.

All Parent Advisors reviewed feedback messages. Six parents reviewed the preschooler feedback messages and five parents reviewed the toddler feedback messages.
The feedback from all Parent Advisors was used to further revise the feedback messages focusing especially on the length, content, and language and any other issues. Parents commonly commented on the length of the messages as a barrier stating, “Great info – but too text heavy. Gets lost in the text – please use subtitles” (PA06) and “all the information is good, but it seems a bit too long for me” (PA08). Parent Advisors indicated where language was not clear prompting further revisions to the feedback messages. For example, a Parent Advisor suggested changing the wording of “avoid convenience food.” The way it is now sounds is confusing until the whole paragraph is read” (PA10). The Nutri-eSTEP team then finalized the messages.

5.4.4 Phase Three: Usability Testing

All Parent Advisors (n=11) and some additional conveniently-recruited Parent Volunteers (n=8) completed the usability testing. Problematic areas in functionality were identified along with major problems (e.g., wording directing participants to the incorrect function, etc.). Some participants noted features that were incorrect and others noted features based on personal preference. Qualitative and quantitative data were collated from the one-on-one usability testing including data on previous frequency of computer use. Quantitative results are shown in Table 5.0.
Table 5.0: Selected Quantitative Feedback from Usability Study on the Preschool Nutri-eSTEP

<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
<th>Frequencies (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>In a week, how many hours do you spend using a computer?</td>
<td>&gt;15</td>
<td>53% (10)</td>
</tr>
<tr>
<td></td>
<td>4-15</td>
<td>37% (7)</td>
</tr>
<tr>
<td></td>
<td>1-3</td>
<td>10% (2)</td>
</tr>
<tr>
<td>In a week, how many hours do you spend using the web, not including e-mail?</td>
<td>&gt;15</td>
<td>26% (5)</td>
</tr>
<tr>
<td></td>
<td>4-15</td>
<td>42% (8)</td>
</tr>
<tr>
<td></td>
<td>1-3</td>
<td>32% (6)</td>
</tr>
<tr>
<td>In a week, how many times do you conduct searches using the internet?</td>
<td>&gt;20</td>
<td>37% (7)</td>
</tr>
<tr>
<td></td>
<td>10-20</td>
<td>37% (7)</td>
</tr>
<tr>
<td></td>
<td>2-9</td>
<td>26% (5)</td>
</tr>
<tr>
<td>Did you read the instructions?</td>
<td>Yes</td>
<td>74% (14)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>26% (5)</td>
</tr>
<tr>
<td>Question</td>
<td>Response</td>
<td>Percentage</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------</td>
<td>----------</td>
<td>------------</td>
</tr>
<tr>
<td>Does the main page motivate you to go further?</td>
<td>Yes</td>
<td>68% (13)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>21% (4)</td>
</tr>
<tr>
<td></td>
<td>Maybe</td>
<td>11% (2)</td>
</tr>
<tr>
<td>Did you notice the status bar at the top?</td>
<td>Yes</td>
<td>79% (15)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>21% (4)</td>
</tr>
<tr>
<td>Was the status bar useful?</td>
<td>Yes</td>
<td>68% (13)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>5% (1)</td>
</tr>
<tr>
<td></td>
<td>Don’t Know</td>
<td>5% (1)</td>
</tr>
<tr>
<td></td>
<td>No response</td>
<td>21% (4)</td>
</tr>
<tr>
<td>Do you think the ‘need help’ button information would change your response to the question?</td>
<td>Yes</td>
<td>21% (4)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>58% (11)</td>
</tr>
<tr>
<td></td>
<td>Maybe</td>
<td>11% (2)</td>
</tr>
<tr>
<td></td>
<td>Don’t Know</td>
<td>5% (1)</td>
</tr>
<tr>
<td></td>
<td>No response</td>
<td>5% (1)</td>
</tr>
<tr>
<td>Do you feel you can trust this survey and resources?</td>
<td>Yes</td>
<td>100% (19)</td>
</tr>
</tbody>
</table>
Do you feel that the privacy has been explained and that you are comfortable using this resource?  

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td></td>
<td>95%</td>
</tr>
<tr>
<td>Maybe</td>
<td></td>
<td>5%</td>
</tr>
</tbody>
</table>

Would you use this website if you knew about it?  

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td></td>
<td>90%</td>
</tr>
<tr>
<td>No</td>
<td></td>
<td>5%</td>
</tr>
<tr>
<td>Maybe</td>
<td></td>
<td>5%</td>
</tr>
</tbody>
</table>

The transcribed notes from the ‘think aloud’ portion of the analysis noted some problems with functionality. Parents were able to successfully determine where to start the survey without guidance, yet they indicated that they had to scroll down the screen to get to the start button. Further, parents were confused about the function of the pictures on the left side of the screen in which several images appeared to be superimposed on one another. One parent noted “[I] like the picture but is it supposed to be like that? It’s distracting with two images” (P02). Parents frequently were observed to have clicked on the pictures, which had no further functionality. Parents also noted confusion when the picture did not match what the question was asking, stating, “funny picture – why not show a fruit though” (P10) when the question was asking the parent about the amount of fruit the child eats in a day. Parents also noted discrepancies in the instructions and what actually appeared on the website. On one page, instructions were provided to click on a yellow bar. In the ‘think aloud’ parents noted, “the right bar is not yellow, it is grey” (P06). Parents identified that the goal of completing the tool was clear, that the information was useful, and that it could be completed without external judgements.
Further, parents indicated that they were motivated to complete the survey, indicating few barriers.

Information from the usability phase was summarized by the Nutri-eSTEP team and changes were made to the website.

5.4.5 Phase Four: Survey to Determine Importance of Non-critical Revisions

The usability testing resulted in some obvious major revisions to promote function of the website, but also many preference-related changes. The purpose of the survey was to ensure that the most relevant of these suggested changes were made to the site. The results of the survey are shown in Table 6.0. In the final revision, the NutriSTEP® research team used the results from the survey to make changes deemed relevant by the Parent Advisors.
<table>
<thead>
<tr>
<th>Indicated Change</th>
<th>Rated Responses % (n)</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Make the Start using NutriSTEP® button larger</strong></td>
<td>Very Important 36.36 (4)</td>
<td>Button was made larger</td>
</tr>
<tr>
<td></td>
<td>Important 36.6 (4)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Somewhat important 18.18 (2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Not important 9.09 (1)</td>
<td></td>
</tr>
<tr>
<td><strong>Leave more space between radio buttons (circles to select options when only one answer can be selected)</strong></td>
<td>Very Important 9.09 (1)</td>
<td>Space between radio buttons was not adjusted</td>
</tr>
<tr>
<td></td>
<td>Important 0 (0)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Somewhat important 36.36 (4)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Not important 54.55 (6)</td>
<td></td>
</tr>
<tr>
<td><strong>Put more than one question per page</strong></td>
<td>Very Important 9.09 (1)</td>
<td>Used current format of one question per page</td>
</tr>
<tr>
<td></td>
<td>Important 0 (0)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Somewhat important 27.27 (3)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Not important 63.64 (7)</td>
<td></td>
</tr>
<tr>
<td><strong>Change the word ‘resources’ as it is not clear</strong></td>
<td>Very Important 9.09 (1)</td>
<td>Resources was the terminology used in final website</td>
</tr>
<tr>
<td></td>
<td>Important 0 (0)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Somewhat important 45.45 (5)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Not important 45.45 (5)</td>
<td></td>
</tr>
</tbody>
</table>
5.4.6 Phase Five: Final Review of Toddler Website and Satisfaction Survey

Most of the 8 Anglophone Parent Advisors were very satisfied with the final product (87.5%) with one parent being satisfied (12.5%). Parent Advisors indicated that the product was “clean, [provided a] feel good feeling, and [they were] drawn in” (PA09). Another Parent Advisor stated that Nutri-eSTEP was “excellent. Easy to read and navigate, screens are clutter-free and getting immediate feedback is a huge plus for parents and caregivers.” (PA10). Another commented that “it gives the information without being condescending and allows parents to see what the research is behind the answer” (PA12). Parents also noted functionality preferences stating, “I like that you don't have to press the back button in order to go back and forth between "what is going well" and "what to work on". It's nice to have both buttons at the top” (PA10). Parent Advisors were supportive and positive about the tool and thought that other parents would find it useful and had relevant and helpful information, links, and resources.

5.4.7 Phase Six: Finalization of Website

All revisions and French translations were made and reviewed by the three francophone registered dietitians and three francophone Parent Advisors. The final versions of the toddler and preschooler Nutri-eSTEP websites were made publically available in both English and French in October 2013. After the first month of being publically available, more than 5000 users had completed the online questionnaire (Vanderhout, 2014).

5.5 Discussion

Nutri-eSTEP was developed to provide greater access to ethical nutrition screening for parents of young children and to provide evidence-based messages to
promote behaviour change, and credible resources. This paper describes the iterative process used to successfully develop online platforms for the NutriSTEP® questionnaires and accompanying feedback messages and resources.

A multiphase process was used where each phase informed the development of the subsequent phase. The iterative process allowed for triangulation of results as data were validated by multiple stakeholders to ensure the information was evidence-based and understandable for the target group (Harris et al., 2009). Initial testing determined the feasibility and acceptability of online versions of the NutriSTEP® questionnaires with the intended audience. Further testing confirmed the functionality of Nutri-eSTEP for the intended audience. This intensive process provides useful guidance for the development of future online self-management tools. The advantage of using an iterative process is that the results of each phase influenced the next.

A similar multistep process of development was conducted with a nutrition quality-of-life survey, where each step of the development resulted in a further refined survey questionnaire (Barr & Schumacher, 2003). These authors were guided in this process by their specific goals of providing an end product that had an appropriate reading level of content, was easy and quick to use, and was designed to suit a diverse population (Barr & Schumacher, 2003). This is similar to Nutri-eSTEP, with the added advantage that we included the target group in all phases, thus providing assurance that our tool is suitable for parents of young children.

An iterative process was also employed to ensure that knowledge translation (KT) to our target audience was achieved. The Canadian Institutes of Health Research (CIHR)
defines KT as a dynamic and iterative process. A quality KT process is designed to improve health care or provide more effective health services by applying the transfer of ethical knowledge (Straus, Tetroe, & Graham, 2009), with the intention of involving all key stakeholders to improve health outcomes and efficiency of health care practices (Graham et al., 2006). The dynamic process for the development of Nutri-eSTEP fits within the knowledge-to-action cycle, the KT model accepted by CIHR (Straus, Tetroe, & Graham, 2009). Specifically, the rigorous and evidence-based development of the pen-and-paper NutriSTEP® and Nutri-eSTEP messaging fits under the knowledge creation step of the model. This is the stage that involves prioritization of information from literature reviews and looking at totality of evidence to ensure that the best quality evidence-based information is included (Straus, Tetroe, & Graham, 2009). The action phase of the knowledge-to-action model (Straus, Tetroe, & Graham, 2009) also fits into the development of Nutri-eSTEP as we assessed how parents understood the knowledge and tailored the tool based on scientific methods of evaluating the users' interactions with the tool and the evidence-based suggestions of the NAC. Many self-management tools are created without the help of the target group, which does not always create a relatable final product or allow for knowledge translation to occur successfully (Straus, Graham, & Tetroe, 2009). One of the goals of Nutri-eSTEP is to serve as a knowledge translation (KT) vehicle to raise parental awareness while providing resources to support self-management. Knowledge translation is also relevant to ethical screening practices as feedback messages that are provided are individualized based on the responses to the questionnaire, providing an exchange of information designed to promote behaviour change. Knowledge translation (KT) is also putting knowledge into practice in an effort
to change behaviours, practices, and policies (Ho, Chockingam, Best, & Walsh, 2003; Straus, Tetroe, & Graham, 2009 and benefits from the integration of relevant theoretical frameworks with practice (Graham et al. 2006). Hence, two health behaviour change theories provided the foundation for Nutri-eSTEP: Social Cognitive Theory (SCT), and the Health Belief Model (HBM).

Looking largely at the *perceived benefit and perceived obstacles* constructs of the HBM (Gerand & Shepard, 2012), parents identified both constructs when describing key advantages to the Nutri-eSTEP tool. Furthermore, the feedback messages were written to target behaviour change based on the theoretical constructs of HBM and SCT. Following the HBM, Parent Advisors identified that they found the tool motivating and that barriers to using the tool were low. By promoting the tool through the media and health professionals, the last construct of the HBM, *cue to action*, has begun to be implemented. Feedback messaging was implemented to follow SCT as well. Particularly, feedback messages were written to promote self-efficacy and provide parents with confidence. Further testing on whether or not self-efficacy of parents feeding their young children has increased is needed in future research. However, grounding our messaging in health behaviour theory provides a basis for later evaluation.

Through the use of the NAC who have expertise in developing nutrition materials for most users, we had assurance that the content and images shown on Nutri-eSTEP are at an appropriate level. Having experienced health professionals review the messages ensures that the information provided is evidence-based and most beneficial for parents to
use. Since our NAC members were from different locations across Canada, we are confident of the applicability of Nutri-eSTEP for most Canadians.

By having consulted many health professionals, we are confident in the feedback messages on Nutri-eSTEP; however, it is essential to ensure that those who use the resource find it useful and appropriate (Straus, Tetroe, Graham, 2009). Therefore, the importance of including the target audience in the development is an essential component to the overall understandability and acceptability. Parents who participated in this project were recruited within proximity of the research team and were mainly from Northern and Southwestern Ontario. The sample of Parent Advisors provides the perspectives of a variety of parents within the Canadian demographic.

Determining the feasibility of Nutri-eSTEP through key-intercept interviews provided information to guide the development of the pilot website. The user testing provided feedback for improving the implementation of the online self-management tool and provided an idea of how the tool will be used in the target population.

In summary, despite some minor challenges (e.g., obtaining agreement with the NAC), the triangulation of feedback from parents, experts, and the research team resulted in excellent feedback messages for Nutri-eSTEP.

Usability testing is an established method for assessing user interaction and the functionality of surveys (U.S. Department of Health and Human Services, 2014). The cognitive interviewing method stems from cognitive psychology (Jaspers, 2009), and involves one of two techniques: verbal probing and the think aloud method (Chaney,
‘Think Aloud’ is a very direct method that gains deep understanding into the problems that users encounter while interacting with systems (Jaspers, 2009).

Usability of e-screening has been described in the literature, and other studies have employed similar methods of assessing these interactive tools (Farrell, Zerull et al., 2009). Using the ‘think aloud’ method, we were able to assess the target audience’s ability to navigate and understand the content as they went through the website. It is important to note that we had a larger population of parents (n=19) complete the usability testing compared to similar studies (n=9) on assessing the usability of online tools (Farrell, Zerrull et al., 2009). Usability is essential to Nutri-eSTEP as it takes the identified problems that have been noted to inform appropriate changes to the website (Chaney, 2012).

The usability phase is participatory action research that involves the implementation of a planned action to observe effects, with the researcher being aware of the setting, culture, and other factors that would influence the interaction (Harris et al., 2009), such as computer knowledge. In our study, all parents who completed the usability phase (n=19) indicated that they trusted the resource, providing assurance that other parents completing the tool on their own may note the same identifiers that parents indicated made it clear the website was credible and provided accurate information. Benefits of usability testing that are directly applicable to Nutri-eSTEP are: a) increased productivity, as parents are able to easily use the website without any errors or confusing navigation; b) reduced errors, as we know that parents successfully understand the function of the website and can access appropriate information; c) decreased need for
user training and system support, as parents with limited computer knowledge can easily adapt to the website's simple functions; and, d) improved satisfaction and acceptance from users, as parent advisors have indicated that they are satisfied with the website (Jaspers, 2009).

One of the additional phases that we added to the development of Nutri-eSTEP compared to Nutri-eSCREEN was a survey to capture the importance of a wide range of changes captured from the usability phase. This allowed us to narrow down the most urgent concerns regarding the tool and other suggestions that were not considered priorities or necessary to fix. A survey was used for this phase due to time constraints. This phase was necessary as IT (information technology) time was restricted; however, a more time-consuming Delphi process would also have been beneficial in order to assess the priority changes (Hasson, 2000). Nevertheless, through our sample of Parent Advisors and their previous knowledge using the website and the success of the parents participating in the usability phase give us confidence that the most necessary and pertinent changes were made.

Different self-management tools exist, particularly for adults and older adults managing chronic conditions. However, few of these valid and reliable tools are publically available, without cost, online. We are not aware of any similar tool with the functionalities of Nutri-eSTEP, outside of Nutri-eSCREEN which was the one of the inspirations for Nutri-eSTEP. Studies have shown that 58 - 80% of internet users access health information online through search engines such as Google (Mackert, Kahlor, Tyler, Gustafson, 2009; Samoocha et al., 2010), providing evidence of the potential
interest in online applications, such as nutrition screening. Using the internet for self-management of health makes information widely accessible and anonymous. Although anonymous, Nutri-eSTEP incorporates messaging that is intended to motivate parents to reach out to health professionals either over the phone or to a health professional to seek advice on questions they may have regarding their child’s health. Parents completing the online screening tool are able to review their results anonymously, receiving messaging promoting health behaviour change and access to helpful links, resources, and registered dietitians, ensuring that our tool follows the ethical standards of nutrition screening (Keller, Haresign, Broest, 2006).

Increased use of obtaining health information online has been shown to improve understanding of health conditions and reduce unnecessary visits to health professionals, although users can find it difficult to access and determine the credibility (McMullan 2006). Parent Advisors indicated that they all felt the information was credible pointing out the association with Dietitians of Canada and had no safety concerns providing the information asked.

There are other advantages to the use of e-screening such as enhanced data collection and report of outcomes that stem beyond the end user (Jones, 2003). Having accessible data on high risk scores provides the potential for targeted public health efforts as the information collected includes postal codes. Further, parents of young children are provided with links and information to access a registered dietitian provincially. For example, in Ontario, parents completing Nutri-eSTEP are linked to Eat Right Ontario
(ERO) (Eat Right Ontario, 2014), and are able to speak directly with a registered dietitian regarding their concerns at no cost.

5.5.1 Limitations

There are limitations to this project. First, the sample consisted of solely female parents. This is, however, consistent with previous NutriSTEP® research, where the participants have been mainly female (Randall Simpson et al.; 2008, Randall Simpson et al., 2014). This may hinder the generalizability of Nutri-eSTEP to non-female, non-parental caregivers; however, the input from health professionals gives us confidence that the information provided is relevant and readable for the general population. Further, our sample for the surveys to determine non-crucial changes phase and satisfaction survey were limited to just our 8 Anglophone PAs. As well, more than one researcher was involved in the usability phase. Although all research assistants were trained and had an interview guide to follow, there may have been personal differences in style throughout the interviews that may have affected the parents readiness to provide information. Lastly, this study does not address the potential value of Nutri-eSTEP beyond its demonstrated feasibility and functionality for completion by parents. Future research will be required to evaluate the effectiveness of Nutri-eSTEP on constructs such as behaviour change and improved self-efficacy.

5.6 Conclusion

We have described the rigorous iterative process for the successful development of Nutri-eSTEP. This paper provides a template for others wanting to develop an online self-management tool. Establishing rigorous criteria for developing such tools can allow
target groups to use the tools with confidence and improve health behaviours and promote knowledge translation.

Over 5000 users accessed the tool within the first month (Vanderhout, 2014). Further, reliability has been established for the preschooler version of Nutri-eSTEP (Carducci et al., 2014 (manuscript under revision)). Further testing is required in order to determine the effectiveness of Nutri-eSTEP, now that the tool has been developed and is available publically in English and French for parents to access.

5.7 Implications for Research and Practice

Nutri-eSTEP can be used with confidence by English and French speaking parents of preschoolers and toddlers. Nutri-eSTEP alleviates the barriers to nutrition screening with the pen-and-paper versions and provides parents with easily accessible tools to gain credible and reliable nutrition information to support self-management of their children’s nutritional needs. Nutri-eSTEP is time and cost-effective and provides immediate feedback that can reassure, support, and/or provide confidence to parents to seek face-to-face counsel. Nutri-eSTEP advances nutrition screening for young children, and promotes management of nutrition-related behaviours early in life.
5.8 References


CHAPTER 6

6.0 Overall Discussion

This research has demonstrated the successful development of an online nutrition screening and self-management tool for young children. To our knowledge, this is the only online nutrition self-screening tool available for parents of young children with a self-management component aimed to promote behaviour change.

This thesis outlines the development process that used scientific methods to ensure target group satisfaction. Through the direct involvement of parents and health care professionals, we are confident that this tool meets the needs of the target population. Furthermore, it contains appropriate and credible information, links, and resources to promote behaviour change, and provide reassurance and confidence to parents feeding young children. Parent Advisors provided feedback on its functionality, design, and messaging and they were satisfied with the final product. The NAC provided assurance that education specific to preschooler and toddler nutrition is evidence-based, with opportunities to follow up with health care services, ensuring an ethical screening process.

Our experiences through the development process, including barriers and successes that are key to the development process, are fundamental to our final research product. Our experiences and feedback from health service providers (HSPs) and parents who have called Dial-a-Dietitian or completed the online ‘Tell Us What You Think’, accessible from the resource page of Nutri-eSTEP (Vanderhout, 2014), after the development phase was complete, has helped us continue to understand the key
challenges, barriers, and motivators encountered with the use of this self-management tool.

6.1 Participants

As previously mentioned, it was our goal to recruit parent participants with diverse demographic characteristics, reflective of the Canadian population. The recruitment of Nutri-eSTEP participants was a mixture of purposive and convenience sampling. This was important to ensure the acceptability of Nutri-eSTEP across diverse educational and cultural backgrounds with appropriate readability and functionality for all Canadian parents. Retention rates were high as there was no attrition in our Parent Advisor or Parent Volunteer populations. Although the Francophone Parent Advisors did not complete Phase Five, they did complete the review of the translated materials as requested by the Nutri-eSTEP team.

The Parent Advisor and Parent Volunteer samples consisted of parents from Northern and Southern Ontario. These parents had a range of incomes. According to the 2011 census data, the median family income in Canada is currently $72,240 (Statistics Canada, 2013). Incomes of the parents in this project ranged from low to high with 46% of parent advisors earning below the Canadian average median income and 54% earning above. The usability Parent Volunteers had a similar profile to that of the Parent Advisors although most indicated that they did not know their total income level.

In Canada 64.1% of adults between the ages of 25–64 have received post-secondary qualifications (Statistics Canada, 2013), compared to 73% of our Parent Advisors and 63% of our usability Parent Volunteers. Therefore, our Parent Advisor
group was fairly well educated, while the Parent Volunteers were similar to the national average.

Similar to other NutriSTEP® research, the majority of participants were female and married (Randall Simpson et al., 2008; Randall Simpson, 2014). However, the percentage of those who were married was higher in our study (73% of Parent Advisors, 79% of Usability Study) than compared to the national average of 48% of women at child-bearing age (Statistics Canada, 2012). A study assessing health-based internet usage had the majority (81.4%) of their participants being mothers (Khoo et al., 2008), suggesting that mothers may be more likely to seek out health-related information using the internet. Uptake is not likely to be influenced by the predominant female involvement as the inclusion of opinions of the NAC and Nutri-eSTEP team ensure that comments and images are appropriate for all parents of young children.

Results of the 2011 National Household Survey reported that 21% of the Canadian population was born outside of Canada (Statistics Canada, 2014), with our study having 18% of Parent Advisors and 16% of Parent Volunteers reporting that their birth country was not Canada. Again, these levels are fairly consistent with the general Canadian population. In Canada, it is estimated that 21% of Canadians’ first language is not English or French (Statistics Canada, 2013). Our study reported that 18% of our Parent Advisor population and 16% of our Parent Volunteer population’s first language was not English.

It was not necessary for us to collect data on the children beyond their age and gender as the data required from parent participants was about development of Nutri-
eSTEP® and not on the effectiveness of the self-management tool itself. All participants had children who either fit into the toddler (18 – 36 month) or preschooler (3-5 year) age groups.

In summary, although the size of the sample limits the generalizability of results, the parents who participated in the project were reflective of the diversity of Canada. Further, given the purpose of the project, a larger sample size would not be needed or feasible. With 58 - 80% of internet users accessing health information online (Mackert, Kahlor, Tyler, Gustafson, 2009; Samoocha et al., 2010), with a major portion of these being parents of young children (Khoo et al., 2008), being reflective of the current demographic of Canada and expected Nutri-eSTEP users is important.

6.2 eScreening tools

To our knowledge, Nutri-eSTEP is the only nutrition screening and self-management tool for young children that is available online. One other online nutrition screening tool with a self-management component exists for community-dwelling older adults, called Nutri-eSCREEN® (Keller & Haresign, 2013; Keller, Haresign, Wham, & Watson, 2012) and is also available on the same nutrition screening platform as Nutri-eSTEP (www.nutritionscreen.ca). This is the only known screening and self-management tool for young children, which provided the opportunity to develop a framework that outlines key steps in successfully developing such tools.

6.3 Phase 1: Key Informant Interviews

Completing face-to-face key-informant interviews was important as this ensured that understanding of the parents’ views were fully understood and captured. Since we
were able to have the Nutri-eSCREEN® website available while going through the semi-scripted interview, Parent Advisors were able to refer to Nutri-eSCREEN® on the computer for the research assistant. This ensured that data collected were accurate on key differences or changes from Nutri-eSCREEN®. Using a semi-scripted interview provided the opportunity for the formative work to tie in the theoretical frameworks of SCT and HMB. We were able to ask about barriers, concerns, challenges, their current mode of getting health based information and many other questions relating to health behaviour constructs.

Since Nutri-eSCREEN® was the only online screening tool that was evaluated in the interviews, it is possible that parents imagined the Nutri-eSTEP to have similar functionalities. Using a less structured key informant interview process may have allowed space for more creative thinking of what the tool would include and look like. Since the researchers used Nutri-eSCREEN®, it may have caused social desirability, where the participants answer in a way that they perceived the researcher might desire (Monette, Sullivan, & DeJong, 2008). Evaluating other online screening websites may have been useful in preventing this phenomenon; however, there are few such tools. Further, Dietitians of Canada already had the framework for Nutri-eSCREEN®, and was, to some extent, committed to a similar format for Nutri-eSTEP. This limited major changes to functionality. Further, Parent Advisors had already completed Nutri-eSCREEN® before completing the usability testing of Nutri-eSTEP. Having had in-depth experience with a similar site may have made this group of participants more familiar with the functionalities of the tools. Nevertheless, using Nutri-eSCREEN® as a base template
allowed us to probe the Parent Advisors on likes, dislikes, perceived barriers, and perceived benefits.

6.4 Phase 2: Development and Review of Feedback Messages

The inclusion of feedback messages ensured that Nutri-eSTEP fits within ethical screening philosophies. Having a registered dietitian and a senior nutrition student draft the feedback messages based on NutriSTEP® questions was a major strength. The feedback was drafted based on the answers to NutriSTEP® that were already dichotomized into ‘risk’ or ‘no risk’ (Randall Simpson, 2008). This translated to ‘What’s Going Well’ and ‘What to Work On’ for Nutri-eSTEP. The ‘What’s Going Well’ and ‘What to Work On’ sections were kept short with a ‘Learn More’ section providing further detail, which allows parents to choose how much information they need. National Advisory Committee members provided resources from which the messaging was created, ensuring inclusion of the best materials for across Canada. Appendix K provides a listing of these accumulated resources.

A process of review by the NAC, revisions by the research team and then the Parent Advisors ensures that all stakeholders provided input. Thus, we were able to identify critical issues identified by both the Parent Advisors and NAC. Having the target group (i.e., Parent Advisors) input provided us with an understanding of parent’s needs and where there were barriers to understanding the feedback messages. We reviewed a range of comments from health experts who were aware of the most recent evidence-based knowledge available. Further, having a research assistant go through the results of the messaging with the parent advisors ensured that we understood their written
responses. The Nutri-eSTEP research team finalized the messages based on the extensive review of the NAC and Parent Advisors.

Although we are confident with the format and information provided in the feedback messages, some challenges did and still exist. For example, Eating Well with Canada’s Food Guide (EWCFG) (Health Canada, 2011) provides recommendations for children 24 months of age. This posed a problem when writing the feedback messages as the toddler NutriSTEP® is for ages 18 – 35 months. Therefore, if children are less than 24 months of age, there are no recommendations from EWCFG. Alberta NAC members offered suggestions based on their guidelines (Alberta Health Services, 2014) but other NAC members from other provinces felt the information was not suitable for Nutri-eSTEP. This problem continues to persist as a dietitian recently asked for clarification many months after Nutri-eSTEP’s public release (Helen Haresign, personal communication). Action around this issue will be taken to update information once acceptable and adequate information is prepared and/or presented for approval.

Another challenge was the number of comments from the NAC on the messaging. The feedback then needed to be considered for appropriateness. Further, NAC members often disagreed on recommendations, making it difficult to ensure that all messaging was evidence-based. One example of this surrounded the topic of picky eaters. Literature suggests parents should try offering young children a new food items up to 15 times (Carruth et al, 2004; Sullivan & Birch, 1994), while some NAC members felt that parents would not regard this advice and that the recommendation should be much lower.
Since the messaging template (i.e. ‘What’s Going Well’, ‘What to Work On’, and ‘Learn More’) was not completely outlined before the messages were created, a significant amount of rearranging was required at this phase. This phase took more time than expected due to the aforementioned issues.

We are confident that messaging is presented in a way that the target group can learn and begin the process of behaviour change. For example, when an educational intervention of messages after screening in older adults was completed, results indicated that, even when community resources are limited, screening can help increase knowledge and change risk behaviours through personalized nutrition messaging (Southgate, Keller, Reimer, 2010). This was evidenced through a randomized trial with one group receiving the personalized letters and an educational booklet and the other group receiving the personalized letters only. Both groups had reductions in risk scores, with a significant difference evaluated in knowledge change by the group that received the personalized messaging (Southgate, Keller, Reimer, 2010). Further, using an online forum to provide personalized messaging increases the reach of the tool to larger target groups (Brug et al., 1998). When specifically looking at nutrition, online messages that are personalized are received better with more dietary changes than just providing health information (Brug et al., 1998). The results from these studies justify the format in which Nutri-eSTEP results are presented to parents as the results are personalized based on the answer to their question (i.e., “What is Going Well” and “What to Work On”).
In summary, despite some minor challenges, the triangulation of feedback from parents, experts, and the research team resulted in excellent feedback messages for Nutri-eSTEP.

6.5 Phase 3: Website Mock Design and Usability Testing

The benefits of using the iterative process were clear when designing the mock website. We were able to use the results from the key-informant interviews to guide the development of the pilot to identify a design for the pilot website.

A key strength of phase three was the relatively large sample size. A study using the think aloud method to evaluate navigation and content of a tool for assessing depression and alcohol dependence had a sample size of nine participants (Ferrell et al., 2009), whereas we had nineteen participants. If we had used a professional agency to complete the usability testing, it would have been at a significant expense and only six would have participated (Janis Randall Simpson, personal communication). Blair & Conrad (2011) found a positive relationship between sample size and the number of problems identified. They suggest that small increases in sample size can improve the reliability and problem detection that occurs. If further resources were available, increasing our sample size further may have been beneficial as problem identification increases with increased sample size (Blair & Conrad, 2011). Saturation of responses was evident for most major concerns and problems with functionality, although there were many individual opinions collected as well. Overall, the sample size was large enough to obtain adequate feedback and saturation of suggestions with key functionality concerns.
Another advantage of completing the usability trials was that parents used the tool in front of an interviewer who was recording their non-verbal actions and their verbal discussion. This was beneficial as research assistants could make notes when a parent clicked on an item that was not functional, showing us where functions may not have been clear or were confusing. Analysis of this was done through heuristic evaluation, as participants' actions, movements, clicks, and non-verbal actions were observed while they were being interviewed; this is an extremely common usability method to systematically inspect a user-interface design (Beatty & Willis, 2007; Willis 1999).

The usability testing provided a significant number of suggestions for the mock website. The suggestions were brought back to Dietitians of Canada to consider for revision to the website. Due to the large number of suggestions from parents and the time those developing the website had, it was decided to develop a survey to identify the suggestions that seemed to be based on personal preference in order to prioritize which small scale changes were necessary.

6.6 Phase 4: Survey to Identify Key Changes

A survey was developed to evaluate the importance of various changes suggested in the usability study. This is a limitation of usability testing outlined by Blair & Conrad (2011) who suggest that participant responses can be individualized and not reflective of the responses of others. They suggest that an increase in similarity of responses may be noted through further interviewing (Blair & Conrad, 2011). Since conducting further cognitive interviewing was not feasible, a survey was developed and conducted to find consensus of opinions.
This survey did have some key challenges. Given the time constraint of getting this information to Dietitians of Canada, an extensive pilot of the survey was not completed. Rather, a graduate student and an undergraduate research assistant reviewed the survey and offered suggestions.

The timeline to complete the questionnaire was much shorter than Parent Advisors had been given in the previous phases. It was also the first time that they had to independently use a computer-based survey, which may have made it difficult for those with lower computer skills. Further, since it was online, some questions were skipped either accidentally or to reduce their time spent completing it. Parent Advisors did not skip the same questions, and most questions skipped were open-ended, asking for feedback on a particular function of the website.

In the future, it might be more beneficial to gather opinions using the Delphi method. This would ensure that a more reliable consensus of the group's opinions were obtained (Okoli & Pawlouski, 2003). However, given the lag time of obtaining responses and sending out the next iteration, this method was not feasible given our timeline.

Nevertheless, the results of the survey were very helpful in determining the priority of suggestions made in the usability testing.

6.7 Phase 5: Review of Toddler Nutri-eSTEP and satisfaction of final product

Nutri-eSTEP was rated highly among the Parent Advisors. However, a larger sample size is needed to provide a better idea of whether or not parents actually find the tool useful. Since Parent Advisors were invested in the development of Nutri-eSTEP, it is possible that their opinions do not reflect that of the general population. To determine
parental satisfaction, a larger scale analysis would need to be conducted. Since this project focused on the development, further satisfaction studies would need to be completed. An option for this is evaluating the feedback parents leave on the website, which has been done on a smaller scale already; however, very few users (<50) have responded (Vanderhout, 2014).

Furthermore, since the Toddler Nutri-eSTEP was reviewed through the use of an online survey, some Parent Advisors skipped questions. This phase would have been improved had it been face-to-face. However, time was a factor that limited our ability to carry out this phase in-person. Given the similarity with design and functionality of the preschooler and toddler websites, with the questions and feedback being the key difference, it was determined that an in-person review was not necessary. Overall, Parent Advisors were satisfied with Nutri-eSTEP and provided positive open-ended feedback within the survey as well.

6.8 Phase 6: Finalization and translation of website

Heuristic evaluation was done of the final website systematically to ensure that no errors were present. This process was important as some major errors were found, such as the messaging for the question regarding meat intake appearing in the wrong question. This was not noted until this final review phase. Further, having parents who speak French review the translated website helped to ensure that francophone parents would be able to use the website and understand the information. Although the information was translated by a professional translator, it was helpful to have our target group review the work as well. Having French-speaking registered dietitians review the translations is also a key strength as it ensures the messages are translated accurately and appropriately.
6.9 Strengths

There are many strengths of this research. First, using an iterative process allowed us to develop each phase with knowledge from multiple stakeholders. As identified by Glasgow et al. (2003) Nutri-eSTEP follows the strategies suggested to obtain positive outcomes from self-management tools. Nutri-eSTEP was developed to be patient centered with evidence-based information and the inclusion of parents’ thoughts and opinions throughout. Nutri-eSTEP is also ongoing and iterative, with the ability to update information and developed in steps based on users needs. It is also inclusive of collaborative goal setting and decision making, with individualized feedback messages based on parents answers to the NutriSTEP® questionnaire. Lastly, it also incorporates problem solving, outreach, and follow up with the options to ‘Learn More’ or Dial-a-Dietitian. Further, the iterative process allowed for thoughtful and rigorous research to be completed to guide the development of the design, messages, functionality, modifications, and tailoring of the final tool.

Second, parent and health professional involvement ensured that the target group was satisfied with the results and that evidence-based information to support behaviour change and the use of best practices were included. Many self-management tools are created without the help of the target group, which does not always create a relatable final product or allow for knowledge translation to occur successfully (Straus, Graham, & Tetroe, 2009). Further, many people have difficulty reading and understanding written health information and by including parents in the development of the feedback messages as suggested by Gal & Prigat (2005) and Hoffman & Worrall (2004), we can be confidence that parents can easily read and understand the information provided. The use
of the target group is key to ensuring an appropriate tool is produced and should be adapted by others who are using a similar framework to develop a self-management tool.

Third, ethical screening and guidance for follow-up for parents is clearly provided. Depending on the province in which the parent is located, there is an option to call a dietitian or to follow up with a health professional regarding their results. The feedback messages are individualized based on the answer to the question and allows for parents to reflect on their feeding practices without judgment. This may in turn provide parents with the knowledge to feel confident seeking further advice from health professionals.

Fourth, we have completed the stages of the knowledge-to-action process by Straus, Tetroe, & Graham (2009). The knowledge creation process, including inquiry and synthesis was used to create the feedback messaging and was tailored based on feedback from the Parent Advisors and the NAC. The tailoring stage will continue to keep the knowledge creation process active, as new evidence-based knowledge enters, content may require modification. All seven of the action stages have been implemented in this project. Since the cycle is continuous, we will continue to assess barriers, knowledge, adapt the tool, and evaluate outcomes. Completion of this project will allow us to monitor knowledge use, evaluate outcomes, and sustain knowledge. Since the cycle is continuous, having an online forum allows for easier and immediate revisions to be made to tailor the tool further. Following the CIHR accepted model of knowledge translation helps to ensure that the resource is useful and appropriate (Straus, Tetroe, & Graham, 2009).
Fifth, the feedback messages were written to target behaviour change based on theoretical constructs. Following the HBM, PAs identified that they found the tool motivating and that barriers to using the tool were low. By promoting the tool through the media and health professionals and by informing parents, the last construct of the HBM, cue to action, has attempted to be implemented. If parents hear other parents have completed the tool and found it helpful, that parent is more likely to complete the tool and use the feedback as well. Similarly, if their HSP promotes Nutri-eSTEP to parents and informs them of its use, parents may be more influenced to access and complete the tool as well. Feedback messaging was implemented to follow SCT as well. Particularly, feedback messages were written to promote self-efficacy and provide parents with confidence. Further testing on whether or not self-efficacy, knowledge, and attitudes of parents feeding their young children has increased is needed in future research. However, by grounding our formative evaluation, messaging, and key goals in theory provides a basis for later evaluation.

Sixth, the steps in this project can be used as a framework to guide the development of other online self-management tools. First, ensuring that key stakeholders are involved in the project, including the target group. It is also important to determine a core team that will ensure each phase is successfully completed. Second, formative research must be completed to determine the feasibility and direction of the project. This can be done similarly to this project using key-intercept interviews with a research assistant or could be completed using focus groups if more funding and researcher time is available. Third, the content must be organized and developed by a team of content experts with all wording being reviewed by all stakeholders, including the target
population. Fourth, usability must be completed to ensure that the developed tool achieves the main outcome. This can be done similar to the development of Nutri-eSTEP using research assistants one-on-one with the target group. However, this could also be done with an external company. Utilizing an external company may provide improved results. However, less data would be collected at a much higher cost. Fifth, completing a survey to determine importance of non-critical changes is not a requirement in development of online self-management tools. Although it did help us to determine which items were important to change, this could have been completed using the knowledge of the Nutri-eSTEP team. However, using a Delphi method for this phase may provide improved results. Lastly, the finalization phase of this project is important to catch any last minute errors. This phase ensures that all information is appearing in the proper place and that each function works appropriately. Using a framework to guide the development of self-management tools provides the best information possible in a way that the target population desires.

6.10 Limitations

Although there are many strengths to this project, there are some minor limitations. First, the time constraints of such developmental projects using an iterative process limits the time in which data collection and analysis can occur. Therefore, this posed a challenge for data analysis as efficiency to get information, analyze key concepts and content, and provide outcomes for change for development had tight timelines within each phase.

Second, social desirability may have been a key factor in the responses from our
Parent Advisors. Parent Advisors knew that research assistants were affiliated with NutriSTEP® and may have held back on negative comments for this reason. Further, asking Parent Advisors whether or not they would use this tool, think other parents will use it, or are satisfied with the final product may have promoted a socially desirable answer as they knew the research assistants analyzing their responses, even though we used participant codes to identify participants and not their names.

Third, our recruitment of Parent Advisors did not generate a large response. We advertised mainly through posters and word of mouth. The posters were posted around Guelph and surrounding areas to capture as many people as possible. However, we were limited to the responses that we received which had a small impact on our sample. Although similar to the Canadian population, the sample of Parent Advisors were highly educated with most having at least some post-secondary education. Our sample also did not include any male participants, although this is similar to other NutriSTEP® research (Randall Simpson et al., 2008; Randall Simpson, 2014). This would have increased the generalizability of our results and ensured that the final product was satisfactory for all parents. However, as we incorporated the feedback of the Nutri-eSTEP team and the NAC, this expert opinion increases our ability to provide a product that is applicable to all parents.

6.2 Next Steps

After the launch of Nutri-eSTEP, a review of the knowledge use will help to understand if behaviour change processes did occur and at what capacity are parents utilizing the information within the website. The overall goal of the NutriSTEP® research
program is to improve the nutritional health of Canadian toddlers and preschoolers, with Nutri-eSTEP embedded as one promotion and prevention strategy. If further funding was provided to patch Nutri-eSTEP with the capabilities to ethically and securely store data, nutrition needs could be identified in various communities based on trends, which would support planning and evaluation efforts at a more regional level.

Further research is also needed to determine the effects that completing Nutri-eSTEP has on parents. It would also be interesting to know if parents who returned to the site after making healthful behaviour change experienced increased satisfaction or improved self-efficacy of having more answers in the ‘What’s Going Well’ section.

Nutri-eSTEP could also be used in a greater capacity in primary care. A link between non-HDL cholesterol levels and the NutriSTEP® questionnaires have shown clinical significance (Persaud et al., 2013). Therefore, evaluating the tool clinically could provide increased results into the effectiveness of the tool.

6.3 Implications for Practice

Evaluating the nutrition risk of young children is important, yet paper-and-pencil versions completed with an HSP limits the reach of the population that can access the tool. Nutri-eSTEP provides the potential to reach populations nationwide as well as provide a self-management component that has the potential to raise parental awareness of key nutrition-related information. This information has the potential to promote behaviour change to improve the nutritional health of children at a young age. Feedback has been evaluated by pediatric nutrition experts and by a group of parents, ensuring that Nutri-eSTEP can be used with confidence. Nutri-eSTEP is cost-effective and ethical
providing credible and trusted resources instantaneously. Nutri-eSTEP can support the identification of nutrition risk in young children and provide them with access to health professionals on their own terms, promoting the management of nutrition-related issues earlier in life.

6.4 Contributions to Literature

This project is an important contribution to the literature as the process of development of an ethical and credible online tool to improve the health of young children has yet to be published. Establishing rigorous criteria for developing such tools can allow target groups to use the tools with confidence and improve health behaviours and promote knowledge translation. This research provides a template for others wanting to develop an online self-management tool.

6.5 Conclusions

In summary, this thesis described key developmental phases in creating an online nutrition screening self-management tool with access to provincial links and resources in both English and French. Secondary to this, this research highlights the importance of following a framework that supports knowledge translation and the inclusion of the target group and key professionals to ensure the best quality product is developed while still being acceptable and useful for the target group. While it is important to ensure that information is evidence-based and that best practices are promoted, it is just as important to ensure that parents are able to obtain and read this information in a format that they prefer and desire to be taught. This tool provides parents with a source of evidence-based
information to promote behaviour change through self-management through its inclusion of feedback messages and credible resources.

Most importantly, Nutri-eSTEP was developed using rigorous methods through each phase of the development and the results from such a tool can potentially be used to inform policy and programs throughout the nation.
6.6 References


APPENDICIES

Appendix A: Ethics Approval

The members of the University of Guelph Research Ethics Board have examined the protocol which describes the participation of the human subjects in the above-named research project and considers the procedures, as described by the applicant, to conform to the University’s ethical standards and the Tri-Council Policy Statement, 2nd Edition.

The REB requires that you adhere to the protocol as last reviewed and approved by the REB. The REB must approve any modifications before they can be implemented. If you wish to modify your research project, please complete the Change Request Form. If there is a change in your source of funding, or a previously unfunded project receives funding, you must report this as a change to the protocol.

Unexpected events and incidental findings must be reported to the REB as soon as possible with an indication of how these events affect, in the view of the Responsible Faculty, the safety of the participants, and the continuation of the protocol.

If research participants are in the care of a health facility, at a school, or other institution or community organization, it is the responsibility of the Principal Investigator to ensure that the ethical guidelines and approvals of those facilities or institutions are obtained and filed with the REB prior to the initiation of any research protocols.

The Tri-council Policy Statement, 2nd Edition, requires that ongoing research be monitored by, at a minimum, a final report and, if the approval period is longer than one year, annual reports. Continued approval is contingent on timely submission of reports.

Membership of the Research Ethics Board - General: S.Banerjee, Community Member; J. Carson, Community Member; S. Chuang, FRAN (alt); K. Chuang, Graduate Student; J. Clark, PolSci (alt); J. Dwyer, FRAN; M. Dwyer, Legal; M. Elleray; OAC; B. Ferguson, CME (alt); H. Gilmour, Community Member (alt); J. Goertz, CME; B. Gottlieb, Psychology; B. Giguere, Psychology (alt); S. Henson, OAC (alt); L. Kuczynski, Chair; A. Lauzon, OAC; R. Ragan, Legal (alt); V. Shalla, SOAN (alt); R. Stansfield, SOAN.

Approved: per Chair, Research Ethics Board- General

101
Appendix B: Five Phases of Parent Advisors participation

Phase 1:
- Review a nutrition risk screening website for seniors (Nutri-eSCREEN) and provide feedback via a scripted interview with a research assistant.

Phase 2:
- Review feedback messages and resources created for parents and resources via a questionnaire and an unscripted interview with a research assistant.

Phase 3:
- Review mock preschool website and provide feedback using ‘Think Aloud’ methodology (usability testing) via a semi-scripted interview outline with a research assistant.

Phase 4:
- Review revised preschool website and provide feedback and evaluate importance of changes from usability testing (survey).

Phase 5:
- Review the revised toddler website and provide feedback (survey).
- French-speaking parent advisors: review messages translated into French.
Appendix C: Parent Advisor Message Review Example

Question 1: My child usually eats grain products

Q1. What is going well
Is the content appropriate? Yes___ No____ Not sure____
The length? Too short ____  Too Long _____ Just about right _____
Language? Clear ___ Easy to understand ____ Confusing____

Do you have any comments/suggestions for this message? Please write them below:
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Do you have specific suggestions for wording for this message? Please write them below:
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
### Appendix D: Key Intercept Interview Guide with Parent Advisors on Nutri-eSCREEN

<table>
<thead>
<tr>
<th>Background Information</th>
<th>Do you use any of the following internet technologies: internet searches, email, facebook, linkedin, twitter, test messaging:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Do you provide nutrition information/services to families (please describe):</td>
</tr>
<tr>
<td></td>
<td>Do you provide health information/services to families (please describe):</td>
</tr>
<tr>
<td></td>
<td>Do you provide any other information/services to families (please describe):</td>
</tr>
</tbody>
</table>

**Q1.** Did you have a chance to review the Nutru e-SCREEN site?

**Q2.** Do you think that a similar site for parents of toddlers/preschoolers would be of benefit?

**Q3.** What did you like about this site?

**Q4.** What things would you keep the same for parents of toddlers/preschoolers?

**Q5.** What did you dislike about the site?

**Q6.** What things would you change for parents of toddlers/preschoolers?

**Q7.** Based on your experience, what are some key things you think are important for building a health information internet site specific to parents of young children?

**Q8.** Can you give us name/link to a site that you think is a good one for parents of young children?

**Q9.** What do you see as benefits to an online screening tool?

**Q10.** Do you have any concerns about nutrition screening online for parents of young children?

**Q11.** What should we consider when thinking about having parents provide us with answers to nutrition risk questions?
<table>
<thead>
<tr>
<th>Q12.</th>
<th>What information do you think is important to collect from parent users?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q13.</td>
<td>What are the best avenues to communicate the tool and reach parents and encourage them to use the tool?</td>
</tr>
<tr>
<td>Q14.</td>
<td>What would support parents in completing the tool and using it to seek resources, improve knowledge and change behaviour?</td>
</tr>
<tr>
<td>Q15.</td>
<td>What do you think that health providers would need to have to better understand the web site/screening initiative and promote it to their clients?</td>
</tr>
<tr>
<td>Q16.</td>
<td>How do you think awareness of potential problems should be communicated?</td>
</tr>
<tr>
<td>Q17.</td>
<td>Do you think it would be valuable for parents to revisit the site to see if their score has changed over time?</td>
</tr>
<tr>
<td>Q18.</td>
<td>What are some considerations in providing parents with nutrition info that will help them to change behaviour?</td>
</tr>
<tr>
<td>Q19.</td>
<td>As a parent, how would you see using the NutriSTEP or Toddler NutrSTEP? Would you promote it? (why or why not)</td>
</tr>
</tbody>
</table>
Appendix E: Usability Testing ‘Think Aloud’ Interview Guide and Directions

Usability Testing: Parent Feedback

**Talk Aloud Comments on Main Page**

What do you like about the main page?

What do you NOT like about the main page?

Were the instructions clear (where to start?)

Would you change any of the wording?

Does the page motivate you to go further?

Do you like the picture? Why or why not?

Do you like the colour scheme? Why or why not?

**Talk Aloud Comments on Information Page:**

What do you like about the Your Information Page?

What do you NOT LIKE about the Your Information Page?

Were the instructions clear for completing questions?

Did you read these instructions?

Would you like a picture on the page? Why or why not?

Did you read the “Getting Started”? If not, why not?

Did you read the “Your Privacy”? If not, why not?

**Talk Aloud Comments on Your Survey Instruction Page:**

Were the instructions clear?

Did you notice the status bar on the top? Was this useful for knowing where you were in the site?

What do you think about the pictures on the left side?
Talk Aloud Comments on Your Survey (NutriSTEP questions):

Were the instructions clear? Why or why not?

Was it clear what to do when the ‘hazard pop-up’ came up if she/he missed a question?

Did you like the helpful tips? Why or why not?

Do you like the Need Help button? Why or why not?

Is the Need Help button useful? Why or why not?

Do you think that the Need Help button would change your response to the question? Why or why not?

What do you think about the pictures that are used on the left side of each page? Are they appropriate, is there enough variety? Do you like the concept of one picture over the top of another picture?

Talk Aloud Comments on Summary of Answers:

Is this page useful? Why or why not?

Is the wording on this page clear?

Was it clear that clicking on the question number would display your answer to that question, and let you go back and change your answer to the question?

Is it helpful to be able to review your answers to the 17 questions?

Talk Aloud Comments on Your Results Page with instructions:

Were the instructions clear? Why or why not?

Talk Aloud Comments on Your Results Page after clicking on What is Going Well and/or What to Work On:

Were the instructions clear? Why or why not?

Was it clear that clicking on the question number would provide feedback?

What do you like about these pages?

What do you dislike about these pages?
What did you think about the format for the feedback messages for responses to the NutriSTEP questions for Q # 3, 4, 11, 17?

What do you think of the colour scheme, length, format, etc. for the feedback messages? Did this motivate you to look at the Open Feedback for the other NutriSTEP questions?

Did you click on the Learn More button? Why or why not?

What do you think about the format of the information in the Learn More section? Did this motivate you to look at the Learn More for the other NutriSTEP questions?

What do you think about the options to Print or E-mail the results at the bottom of this page?

Did you click on this button? Why or why not?

Did you click on the Resources button at the bottom of the page? Why or why not?

Talk Aloud Comments on Your Results Pages after clicking on the Print or E-mail Results:

What do you like about the Print or E-mail page?

What do you not like about the Print or E-mail page?

Were the instructions clear?

Would you change any of the wording?

Does the page motivate you to go further and take advantage of printing and/or e-mailing your feedback?

What do you think about the format of the print feedback?

Talk Aloud Comments on Your Resources:

Do you like having links to additional resources… so you can get more info and ideas?

Do you prefer links to a webpage or a document?

What resource sites were most appealing? Would you use the links provided to get more info and ideas?

Do you feel you can trust this survey and resources? Why/why not?
Do you feel Privacy has been explained and that you are comfortable to provide the info being requested

Would you use this site once it is live?

Would you go back to the site to follow up and read more?

Would you recommend/tell a friend?

What did you think about the pictures used on the site? Were the picture appropriate?

Other Comments about the site:
Appendix F: Importance of Changes Survey

1. Name
2. Please rate the following based on the MAIN PAGE of the Nutri--eSTEP website:
   How important is it to:
   Not have to scroll down to click start using Nutri--eSTEP
   3. Make the start using NutriSTEP button larger
   4. Make the green colour brighter
   5. Changing the size of the screen view to ensure that everything appears in direct sight--view on the screen
   6. Put "What is NutriSTEP" in bullet points
      Very Important Important Somewhat Important Not Important
      Very Important Important Somewhat Important Not Important
      Very Important Important Somewhat Important Not Important
      Very Important Important Somewhat Important Not Important
      Very Important Important Somewhat Important Not Important
      Very Important Important Somewhat Important Not Important
    7. Please rate the following based on the INFORMATION PAGE of the website:
       Remove the pencil symbol placed on the left side of the top process bar
    8. Leaving more space between radio buttons
      Very Important Important Somewhat Important Not Important
      Very Important Important Somewhat Important Not Important
    9. Please rate the following on the "YOUR SURVEY" page of the website:
       Remove the overlapping picture concept
    10. Having a percentage completed available on the status bar
    11. Move the "Need Help" button
    12. Put more than one question per page
    13. Make "Next Question" button larger and higher
      Very Important Important Somewhat Important Not Important
      Very Important Important Somewhat Important Not Important
    14. Please rate the following based on the EATING HABITS SURVEY: YOUR SURVEY with
        the summary of the results:
       Instead of saying "Open Feedback" change to "See Your Answer" or "View Answer"
    15. Change text to numbers 10, 14 & 17 so it doesn't just say "My child"
      Very Important Important Somewhat Important Not Important
      Very Important Important Somewhat Important Not Important
    16. Please rate the following on the EATING HABITS SURVEY: YOUR RESULTS with
       Instructions and the buttons for What is Going Well and What to Work On:
       Change the colour of the bars to match what the text says.
    17. Make the look of the page different from the Summary of Responses page
      Very Important Important Somewhat Important Not Important
      Very Important Important Somewhat Important Not Important
18. Please rate the "Your Results" After Clicking on the Feedback:
Make "Learn More" button more prominent
19. Change grey colour
20. Add more interest to the Feedback messages.
Very Important Important Somewhat Important Not Important
Very Important Important Somewhat Important Not Important
Very Important Important Somewhat Important Not Important
21. Please rate the PRINT OR EMAIL page:
Switch Green Colour so that it's what you click to print or e-mail rather than switching between black and underlined and green
Very Important Important Somewhat Important Not Important
22. Please rate the RESOURCES Page:
Change the word Resources as it is not clear
23. Make green colour darker and bolder
Very Important Important Somewhat Important Not Important
Very Important Important Somewhat Important Not Important
Appendix G: Overall Satisfaction Survey

To Parent Advisors:
Thank you very much for your help to date with the NutrieSTEP project.
We are nearly ready to launch the website and are seeking some final feedback from you.
The link to the ‘almost final’ version of the English Toddler site is:
http://uat.esteptoddler.eatrightontario.ca
To date, the process has involved:
Site design and functionality
The basic design for the site was adapted from that for the NutrieSCREEN site. This site was reviewed by members of the National Advisory Committee and by the team of 11 Parent Advisors. The test website was ‘built’ and then reviewed by the NutrieSTEP team, the Parent Advisors, a further 8 parents of preschoolers, and some of the National Advisory Committee Members.
The site that you are being asked to review is the revised site based on all of the above feedback.
Content
Introductory text and information pages – this text was drafted by the NutrieSTEP team and reviewed by the 11 Parent Advisors and the additional 8 parents and some NAC (National Advisory Committee) members
NutriSTEP Questions – the existing questions have been used, with no changes
NutriSTEP Questions Need Help text – this text was drafted by the NutrieSTEP team and reviewed by the 11 Parent Advisors and the additional 8 parents and some NAC members
Feedback Message – these were drafted by the NutriSTEP research team, reviewed by NAC members and then by the 11 Parent Advisors
Resources – these were collated by EatRight Ontario and reviewed by the NutrieSTEP team.
At this point in time, we are asking for your feedback on the ‘almost final’ version of the English Toddler site.
Please keep in mind that we will not be making substantive changes to the design/functionality/navigation at this point in time.
We do, however, welcome comments on any errors or omissions that you may notice.
Finally, we welcome your suggestions on how to promote the NutrieSTEP.
Feedback for this portion will be required by the end of the day on July 7th.

1. Please comment on your overall impression of the website:
2. Please comment on the opening page:
3. Comments on Your Information page
4. Comments on Your Information page
5. Please identify the number of the Your Survey question for which you are commenting on:
   Comments on: Helpful Tips
6. Comments on: Needs Help (again, please identify the Your Survey number that you are
commenting on)
7. Comment on: What is going well?
8. Comment on: What to work on?
9. Comment on: Learn More
10. Comment on: General Healthy Eating
11. Comment on: Meal Planning
12. Comment on: Shopping
13. Comment on: Everyday Cooking
14. Comment on: Healthy Growth
15. Comment on: Physical Activity
16. Comment on: Healthy Growth
17. Comment on: Food Safety
18. Comment on: Share Your Experiences
19. Comment on: Email
[option]
20. Comment on: Tell a friend
21. Where/how would you promote the website? Please list all of your suggestions.
22. How would you rank your overall satisfaction with the website:
23. Other comments:
   Not Satisfied Somewhat Satisfied Satisfied Very Satisfied
Appendix H: Screening Questionnaire for Studies

Usability Screening Script

Thank you very much for responding to the ad to take part in the study for an internet version of NutriSTEP®.

We have had a lot of interest in participation and I would just like to ask you a few questions to see if you are eligible.

1. Are you the parent of a toddler (18 - 35 months) or a preschooler (3 -5 years)?
   □ Yes □ No

2. What is your highest level of education?
   ______________________________________
   (must have high school education or more to participate)

3. Were you born in Canada?
   □ Yes □ No
   (want some parents not born in Canada)

4. What is your first language?
   (want some parents whose first language is not English)

5. Do you read and speak English at a high school level?
   □ Yes □ No

6. Are you willing to participate in a project that will take about 30 minutes on 1 occasion and about 15 minutes on another occasion?
   □ Yes □ No

9. Do you use the internet?
   □ Yes □ No
   (want some parents who do not use the internet)

Thank you very much for answering these questions. We will get back to you shortly about your participation.
Appendix I: Example of Letter (Usability Study)

Nutri-eSTEP Development
Usability Testing
Research Project Participant Information

Purpose of the Study

You are asked to take part in a research project, funded by the Canadian Institutes of Health Research by Professor Janis Randall Simpson from the Department of Family Relations and Applied Nutrition at the University of Guelph.

This research is part of an ongoing program, Nutrition Screening Tool for Every Preschooler (NutriSTEP®) (www.nutristep.ca). NutriSTEP® is a simple checklist of 17 questions parents complete to see if their preschool children (ages 3-5 years) are healthy eaters. This checklist is called a screening tool. This is the first nutrition screening tool for parents of preschoolers to be developed anywhere in Canada or the United States. NutriSTEP® helps parents be more aware of the nutrition issues of preschoolers and reassures the parents of young children who are doing well. As well, nutrition screening directs parents to community health and nutrition resources. We have also developed a Toddler NutriSTEP® for children 18 - 35 months of age.

The overall goal of the current project is to develop a website for an online version of NutriSTEP® and Toddler NutriSTEP®, which will be hosted on the Dietitians of Canada website and available to all Canadian parents.

We are asking for your participation in this project to test the mock website for a new online version called Nutri-eSTEP. Participation will involve about 1 hour on one occasion in February - March, 2013.
If you choose to participate in this project, you will be asked to do the following:

- Read this information letter about the project
- Read and sign a consent form
- Review the mock Nutri-eSTEP website with a research assistant and give your opinion about how easy the site is to use, what you like and don't like about the site, etc.

**Potential Risk and Discomforts**

The risk involved with taking part in this project is low. Should you have concerns about childhood nutrition issues, you can contact Janis Randall Simpson, a Registered Dietitian.

**Potential Benefits to Participants and/or to Society**

How will you benefit? The overall benefit of this project is to have nutrition screening questionnaires for parents of toddlers and preschoolers available online in Canada.

**Confidentiality**

All research materials will be stored in a locked cabinet or on a password-protected computer in a locked office at the University of Guelph for seven years and will be destroyed following approved procedures. Data collected from this project will be used as part of graduate and undergraduate student projects and may be published in journal articles.

**Participation and Withdrawal**

You can choose to take part in this project or not. You may stop at any time without consequences. You will still receive compensation for the parts of the project completed
should you withdraw from the project. You may ask to have your information removed from the study by the researchers.

Project Incentives

To thank you for taking part in this study, we will give you $40 in grocery vouchers.

Rights of Research Participants

You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights or remedies because of your participation in this research study. This study has been reviewed and received ethics clearance through the University of Guelph Research Ethics Board. If you have any questions of your rights as a research participant, please contact the Research Ethics Officer, Sandy Auld University of Guelph, 437 University Centre, Guelph, ON N1G 2W1. Phone: 519 824-4120, ext. 56606; FAX: 519 821-5236; E-mail: reb@uoguelph.ca.

Nutri-eSTEP

This project will result in an online version of the NutriSTEP® and Toddler NutriSTEP® questionnaires that are licensed for distribution by the University of Guelph.

Research Institute and Researchers

The researcher at the University of Guelph who is conducting this project is listed below. Please feel free to contact her at any time with any questions.

Janis Randall Simpson, PhD, RD, Assistant Professor, Department of Family Relations and Applied Nutrition, University of Guelph, 519-824-4120, ext. 53843. rjanis@uoguelph.ca.
The co-investigator at the University of Waterloo who is conducting this project is listed below:

*Heather Keller, PhD RD, Professor, Department of Kinesiology, University of Waterloo. hkeller@uwaterloo.ca.*

The co-investigator at Dietitians of Canada who is conducting this project is listed below:

*Helen Haresign, Dietitians of Canada. helen.haresign@dietitians.ca*

**Graduate Student Research Assistants**

*Maria Reesor, BASc, Graduate Student, Department of Family Relations and Applied Nutrition, mreesor@uoguelph.ca*

*Bianca Carducci, BSc, Graduate Student, Department of Human Health and Nutritional Sciences, bcarducc@uoguelph.ca*

**Research Assistants**

*Holly-Anne Scott, BSc, Research Assistant, Department of Family Relations and Applied Nutrition, scotth@uoguelph.ca*

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Julia Campbell, Graduate Research Assistant, Department of Family Relations and Applied Nutrition, campbelj@uoguelph.ca

Joanne Clark, Graduate Research Assistant, Department of Family Relations and Applied Nutrition, jclark14@uoguelph.ca

Research Consultant

The research consultant in Sudbury who is conducting this project is listed below. Please feel free to contact her at any time with any questions.

Lee Rysdale, MEd, RD, Consultant, Sudbury, ON. lrysdale@eastlink.ca
Appendix J: Consent Form

Department of Family Relations and Applied Nutrition
College of Social and Applied Human Sciences

Nutri-eSTEP Website Development
Usability Testing

Consent Form

Signature of Parent/Legal Guardian

• I, ________________________, have read the information for the Nutri-eSTEP™ Development (Intermodal Reliability Testing). My questions have been answered to my satisfaction, and I am therefore providing my informed consent, as indicated by my signature below.

• I know that I am free to stop taking part in the study at any time and that my confidentiality (should I so elect) will be protected.

• I have been given a copy of this form.

___________________________________  __________________________________
Name of Participant (Please print)   Name of Witness (Please print)

___________________________________  __________________________________

120
Signature of Participant: ________________________

Date: ____________________

Signature of Witness: ________________________
Appendix K: Background Information of Participants

*Nutri e-STEP*

*Usability*

Participant Background Form

*We are interested in obtaining some information about you and your family in order to better understand who is helping us out with this project. Please complete the following questions to provide us with some background information on your child and family. Provide only one response for each question. Feel free to not answer certain questions if they make you uncomfortable.*

Please **do not** put your name on this paper.

1. a) How old is your child _______ (years)_________ (months) for whom you are doing this study?
   
   b) What is the gender of this child? [ ] Male [ ] Female
   
   c) Does your child have a medical condition diagnosed by a doctor? [ ] Yes [ ] No
   
   If Yes, please describe____________________________________________________________

2. For the following people, what is the language they first learned as a child, the country they were born in, and ethnic or cultural background?

<table>
<thead>
<tr>
<th></th>
<th>Mother</th>
<th>Father</th>
<th>Your Toddler</th>
</tr>
</thead>
<tbody>
<tr>
<td>First language</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Country born in</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethnic or cultural</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Background (e.g. First</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nations, Italian, etc.)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. Age and Gender
a) Your age: __________

b) Are You: [ ] Male   [ ] Female

4. Your Marital Status:

5. a) How many PEOPLE live in your household *(include all adults and children)*

   __________

   b) How many ADULTS live in your household? __________

   c) How many CHILDREN live in your household? __________

6. What is YOUR highest level of education?
   [ ] Elementary   [ ] Some College/University
   [ ] Some High School   [ ] Graduated College/University
   [ ] Graduated High School

7. What is your TOTAL household income after taxes?
   [ ] less than $15,000   [ ] $30,000-$59,999   [ ] over $90,000
   [ ] $15,000-$29,999   [ ] $60,000-$89,999   [ ] don’t know

Thank you for your input!