

Development of a Theory-based App to Promote Gut Health for Celiac Disease: MyHealthyGut

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Background

- Celiac disease is a chronic condition that can impact all aspects of an individual's life, and is prevalent in 1% of the North American population (Ludvigsson et al., 2013).
- Currently the only treatment is to follow a strict gluten-free diet in order to prevent symptoms as well as decrease the risk of long-term health consequences such as infertility, osteoporosis, and intestinal and bowel cancers (Green & Cellier, 2007).
- Drawing from the mobile health (mHealth) literature, the use of technology to self-monitor behaviours is gaining empirical evidence as an effective and efficient means to assist in self-monitoring dietary behaviours and disease symptoms (Burk et al., 2011; Cafazazzo et al., 2012).

Purpose

- The overall goal of this study was to design and pilot test a smartphone app, MyHealthyGut, which was created to improve overall gut health and promote effective self-management of celiac disease.
 - The purpose of Part 1 was to gather feedback from end-users (adults with celiac disease) regarding the desired functions and content of an app for celiac disease.
 - The purpose of Part 2 was to pilot test the MyHealthyGut app with end-users and health care providers.

Method

- Part 1** - 118 adults ($M_{age} = 39.25$ yrs, 91.5% female, 95.8% Canadian) diagnosed with celiac disease completed an online questionnaire pertaining to self-regulation strategies, perceived need for a smartphone app to help manage celiac disease, desired functions and features in an app and tone of the health content of the app.
- Part 2** - 12 Calgary-based adults (86% female, $M_{age} = 49.43$ yrs, $SD = 8.28$ yrs) with celiac disease attended focus groups after beta testing the app for a 1-week period. 7 healthcare professionals provided online feedback about the app after using it for a 1-week period.
- Questions.** Questions focused on the functionality, ease of use, and content of the app, discussion of the feedback raised by prior focus groups and overall satisfaction with the app.

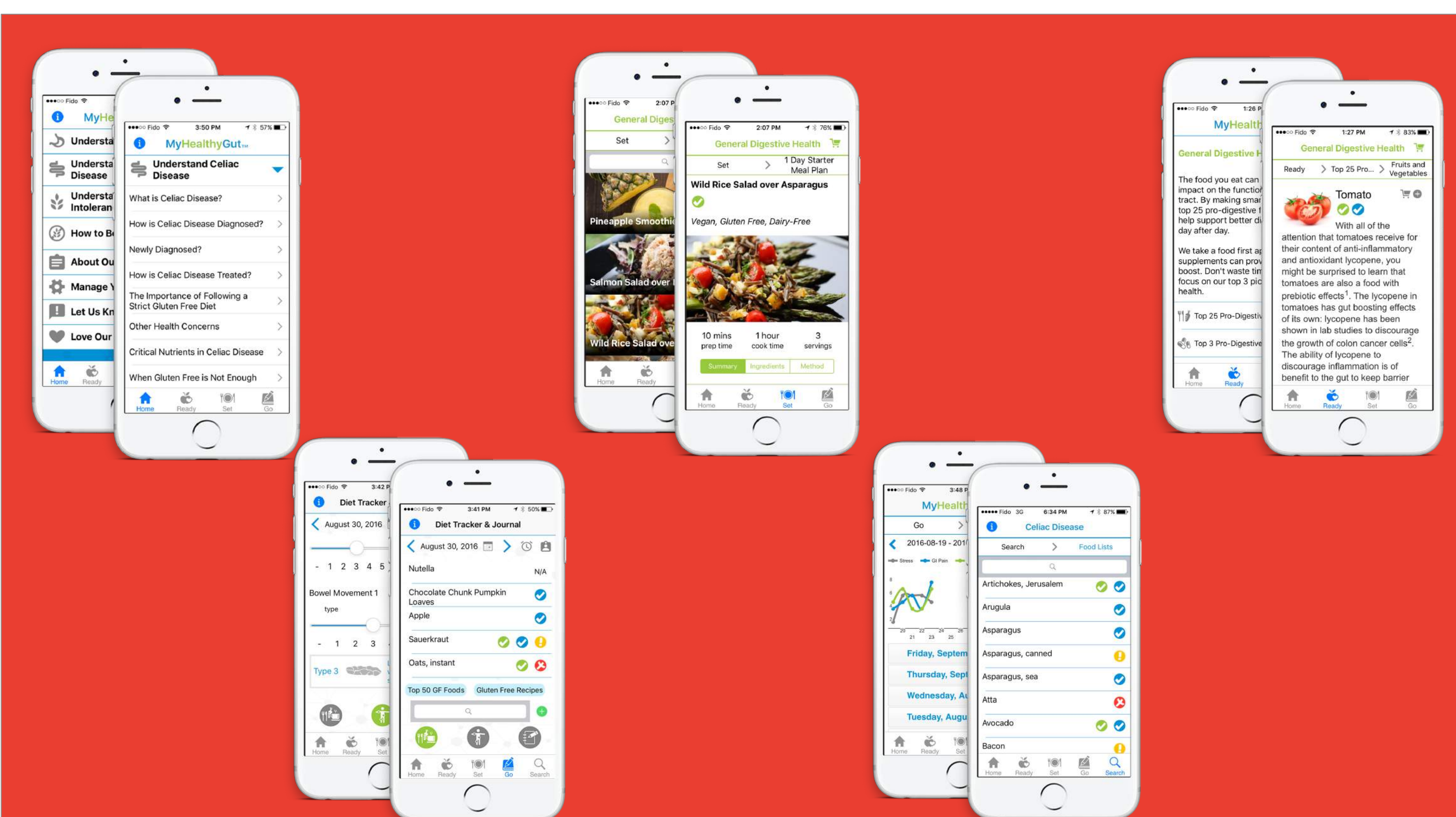


Figure 1. The final product after incorporating feedback from focus groups.

Results - Part 1

- Over 90% of participants indicated a need for an app for celiac disease. The majority of participants used diet as the sole strategy to manage celiac disease (Table 1).
- Ease of use, available functions, nutritious GF recipes and cost were the top four most important perceived factors to 40-60% of participants for an app to manage celiac disease.
- Over 25% of participants also indicated it was important to have a list of the top 100 GF foods and evidence-based supplements, the ability to track symptoms and cooking tips.

Table 1. Current Celiac Disease Management Strategies & Perceived Need for an App (n = 118)

Strategies	Always (Daily)	Often (Weekly)	Sometimes (1-2x/mth)	Rarely (>1x/mth)	Never
Diet	113	2	1	1	0
Supplements	42	14	13	9	38
Physical Activity	28	42	14	16	15
Mind-Body Therapies	9	9	7	18	69
Medication	8	1	12	18	74
Other	4	0	0	3	78
	Yes	No			
Perceive need for app to assist in mgt of celiac disease?	107	11			

Results – Part 2

- Focus group participants suggested revisions to the app pertaining to functionality and ease of use (e.g., clearly marked way-finding buttons, enhance onboarding), improving the symptom journaling feature, and app content (e.g., add information on irritable bowel syndrome).
- The majority of healthcare professionals reported positive perceptions of the app and reported similar revisions to content, functionality and ease of use.

Table 2. Summary of Findings from Online Questionnaire with End-Users (n = 12)

Question	Response	Further Information
How easy is the MyHealthyGut app to use?	$M = 3.60, SD = 0.91$	1 (extremely difficult) – 5 (extremely easy)
How likely are you to use the MyHealthyGut App to help you manage your Celiac disease in the future?	$M = 2.46, SD = 1.12$	1 (very unlikely) – 5 (very likely)
How satisfied are you with the following features?		1 (very unsatisfied) – 5 (very satisfied)
- Diet tracking	$M = 3.07, SD = 1.27$	
- Symptom journaling	$M = 2.80, SD = 1.15$	
- 7 day meal plan content	$M = 3.07, SD = 1.22$	
- Meal planning	$M = 3.07, SD = 1.22$	
- Cooking tips	$M = 3.00, SD = 1.41$	
- Supplements	$M = 3.40, SD = 0.99$	
- 100 recommended foods	$M = 3.40, SD = 1.30$	
How much do you agree with the following statement? The MyHealthyGut App will improve my health.	$M = 4.00, SD = 0.92$	1 (strongly disagree) – 5 (strongly agree)
What was your first reaction to the MyHealthyGut App?	$M = 1.20, SD = 0.94$	1 (very negative) – 5 (very positive)
How would you rate the quality of the MyHealthyGut App overall?	$M = 3.33, SD = 1.23$	1 (very low quality) – 5 (very high quality)
How well did the MyHealthyGut App meet your needs?	$M = 2.27, SD = 1.22$	1 (not at all well) – 5 (extremely well)
How likely would you be to purchase the MyHealthyGut App?	$M = 2.73, SD = 1.28$	1 (very unlikely) – 5 (very likely)
How likely are you to use the MyHealthyGut App to monitor your diet and/or track symptoms?	$M = 3.07, SD = 1.16$	1 (very unlikely) – 5 (very likely)

Table 3. Healthcare Professional Feedback (n = 7)

Question	Response	Further information
What was your overall impression of the MyHealthyGut app?	Positive = 5 Negative = 2	
Does the nutrition information provided in the app fall in line with what you advise your patients?	Yes n = 5 No n = 2	1 HCP suggested too many high FODMAP foods 1 HCP said she was not well enough informed – the app provided more information
Is there evidence-based nutrition information that is missing in the app guidance?	Yes n = 1 No n = 6	1 HCP suggested recommending foods lower in FODMAPs
Would you recommend the app to another healthcare provider?	Yes n = 5 No n = 2	1 HCP said she was “still up in the air, depends on cost.” 1 HCP said she thought it would be better suited as a website
How easy is the MyHealthyGut app to use?	$M = 3.86;$ $SD = 0.90$	2 HCPs reported low satisfaction due to difficulty navigating the app
How satisfied are you with the diet tracking feature in the MyHealthyGut app?	$M = 3.86;$ $SD = 0.70$	
How satisfied are you with the symptom journaling feature in the MyHealthyGut app?	$M = 3.71;$ $SD = 0.76$	
How satisfied are you with the meal plan content feature in the MyHealthyGut app?	$M = 3.14;$ $SD = 1.36$	1 HCP reported low satisfaction due to some recipes high in FODMAPs
How satisfied are you with the educational information in the MyHealthyGut app?	$M = 3.86;$ $SD = 1.46$	1 HCP reported low satisfaction due to too much content on the app, felt better suited for a website
How satisfied are you with the food recommendations feature in the MyHealthyGut app?	$M = 4.43;$ $SD = 0.58$	
What are the top 3 things (e.g., functionality, content, usability) that need to be changed or modified and why?		Recipes – lower in FODMAPs, easier (n = 2) Content – more on gluten free cooking (n = 2) Bar code scanning (add functionality) (n = 1) Journaling – add ability to track exercise, dining out, timing of symptoms, sleep (n = 1) Improve navigation (n = 1) No changes (n = 1) Add more content & visuals (n = 1) Change from app to website due to too much content (n = 1)
What are the top 3 things (e.g., functionality, content, usability) that you liked about the app and why?		Good content (n = 5) Easy navigation (n = 5) Recipes (n = 2) Psychosocial content (n = 1) Symptom tracker (n = 1)

Note. Means are for scales on a scale of 1 (low) – 5 (high). FODMAPs = fermentable oligosaccharides, disaccharides, monosaccharides, and polyols.

Conclusion

- Health-related mobile applications make smartphones useful tools in providing point of care to the user.
- Participants reported a need for the MyHealthyGut app, listed desired content, features and functions and provided feedback to revise the content, features and functions of Version 1.0 of the MyHealthyGut app.
- MyHealthyGut is the first evidence-based app that may be helpful in empowering users to effectively self-manage celiac disease and promote general gut health.

References & Acknowledgements

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