Published in final edited form as:

Int J Med Inform. 2011 November ; 80(11): 765–774. doi:10.1016/j.ijmedinf.2011.08.002.

Engagement in “My Child’s Asthma”, an interactive web-based pediatric asthma management intervention

Hendrika Meischke, Ph.D., MPH[Professor],

Department of Health Services, University of Washington

Paula Lozano, MD, MPH[Assistant Director],

Preventive Care, Group Health Cooperative, Associate Investigator, Group Health Research Institute

Chuan Zhou, PhD,

Department of Pediatrics, University of Washington, Center for Child Health, Behavior and development, Seattle Children’s Research Institute

Michelle M. Garrison, PhD[Principal Investigator], and

Center for Child Health, Behavior and Development, Seattle Children’s Research Institute

Dimitri Christakis, MD, MPH[George Adkins Professor]

Pediatrics, University of Washington, Director, Center for Child Health, Behavior, and Development, Seattle Children’s Research Institute

Abstract

Purpose—The internet is a promising tool for delivering health behavior change programs although such interventions raise questions about participant engagement in this medium. In this study we sought to determine the characteristics of parents who engage in an internet-based health intervention for their children (with asthma) and to distinguish parents who engage at the prescribed intervals versus those who engage less often

Methods—N=283 parents with children who had asthma were recruited and randomized to receiving a web-based intervention. Participants filled out six surveys over a 6-month period asking them about demographic and clinical characteristics, outcome expectations and self-efficacy beliefs regarding asthma control for their child, and attitudes about computers and the internet. Descriptive statistics were used to describe the population and analyze associations

Results—Controller use and being adherent to this medication as well as positive outcome and self efficacy expectations were associated with increased engagement. Parents who logged on only once reported significantly less frequent use of the internet than parents who logged on to all sessions

Discussion and Conclusion—The results of this study suggest that it is important to find ways to increase engagement in a web-based intervention for parents who are not yet engaging in the recommended behaviors and/or who report less positive outcome and efficacy expectations around asthma management

Introduction

Over the past decades, web based delivery of health promotion programs has received a great deal of attention and evaluation.[1] As internet access continues to increase opportunities to reach broad audiences make this technology a promising tool for health behavior change programs.[2] Web-based interventions have become increasingly popular as a way of reaching clinical and general population audiences [1,3–10] due to features of web-based communication that facilitate message delivery such as, tailoring of messages, instant feedback and ability to track progress over time. Internet-based interventions are capable of providing all of these features, and hold promise for effective and efficient delivery of health behavior change programs. However delivering such interventions via the internet also raises questions about participant engagement in this medium.

Two issues detract from the enthusiasm for web-based interventions. First, internet-health information seekers are usually more health-oriented than those who do not use this medium for health information.[11], thus limiting the reach of internet-based interventions. Second, program engagement is often less than what was envisioned [12] and little research is available on characteristics that predict engagement in web-based interventions. [13] Although some web-interventions are designed for a one-time interaction, others, particularly those dealing with a chronic disease or problem, are designed to track progress and provide feedback over time. As such, efforts to engage people in continued exposure to a web-site that needs to be accessed periodically is key to success of such interventions.

In some recent studies, demographic variables, as prior health behaviors and health motivation were associated with engagement in health related web-based interventions. For instance, Strecher and colleagues, [14] showed that older, more educated female study participants were more likely to engage in a web-based smoking cessation intervention than younger, less educated, male counterparts, as measured by the number of web-based sessions opened. Another study of engagement in an Internet-based Weight loss program also showed that males were less likely to be or continue to be engaged both in the initial exposure to intervention content as well as in the follow-up electronic newsletter. [15] Implementation of a worksite self-help web-based program for stress management showed that being a woman, having a secondary education, regular physical exercise habits and having positive expectations of the program were significant predictors of high use of the program [16] Similarly, being female and having a strong motivation to be healthy was associated with continued usage of an online health communication program for physical activity [17]. In summary, gender, education, health motivation, and health behaviors appear associated with engagement in web-based programs targeted at adult individuals. It's not clear if these same factors are related to engagement in a web-based program that focuses on chronic illness management for a pediatric population

In this study we explored factors that predict engagement over a 6 month period among parents who joined a web-based intervention study for asthma management of their young children (2–10). The study design included monthly visits to the site. Our main interest was in the group of parents who followed the recommended engagement schedule and log on every month. We sought to determine:

1. characteristics of parents who engage in the internet-based health intervention for their children (with asthma),
2. characteristics that distinguish parents who engage at the prescribed intervals over 6 months vs. those who engage less often than prescribed,
3. characteristics that distinguish those who engage one time only vs. those who engage in all five visits (super-engagers)

4. factors predicting engagement among participants with children whose asthma was not well controlled at baseline—a key target group for this intervention

We explored socio-demographic variables, level of severity of child's asthma, current asthma management behaviors, positive and negative outcome expectations regarding daily controller use, and self-efficacy beliefs about asthma management of child's asthma. We also included variables related to comfort/attitude with computers and internet access and use. We hypothesized that younger age, male gender of parent and lower educational attainment would be negatively associated with engagement. In addition we hypothesized that positive health beliefs around asthma management (i.e. reflecting a greater health orientation) and positive health behaviors (i.e. engaging in asthma management behaviors) would be positively associated with engagement in this intervention. Last, we wanted to explore if prior experience with the internet and attitudes toward internet use would be associated with engagement with this medium.

Methods

Overview of the My Child's Asthma study

This study was a sub-analysis of participants' engagement in the intervention arm of a randomized controlled trial testing the effectiveness of a web-based intervention to improve asthma control among 2 to 10-year olds. The main objectives of the intervention were to 1) increase controller medication use for children who are currently not on controller medication but for whom controllers are indicated, according to treatment guidelines and based on symptom severity and 2) increase adherence to controller medication for children who are currently on controller medications.

The My Child's Asthma web intervention was developed over a 12 month period. Web content and functionality were guided by several theoretical perspectives. We posited that parents would be at different stages of cognition and behavior regarding management of their child's asthma.[18] We also invoked constructs from Social Cognitive Theory [19], such as the importance of outcome expectations and self-efficacy beliefs regarding asthma management behaviors. The intervention invited parents to participate in an initial My Child's Asthma session (including completing an on-line assessment and receiving additional tailored recommendations) and subsequently invited them to return to the website for a total of five monthly follow-up sessions. The intervention included goal setting to encourage parents to commit to asthma management goals for their child. Each month parents' self-reported behaviors were compared to the goals they set the previous month. If a parent did not set a goal in one month, then s/he was encouraged to do so at the following visit if the child's symptoms indicated suboptimal control or parents reported non-compliance with prescribed treatment.

Severity of child's asthma symptoms as reported by the parent was classified as mild intermittent, mild persistent or worse. Parents who reported their child's asthma was mild intermittent and not on controller medication were encouraged to check back with My Child's Asthma the next month. These parents were not asked to set any behavioral goals, as controller medication is not indicated for this population, according to the treatment guidelines. All other parents received tailored messages based on information obtained during the assessment phase.

Recruitment

Participants were recruited from a large academic primary care network and a health maintenance organization serving a metropolitan area in the Pacific North West. Children between 2 and 10 years of age who had an ICD9 code of 493 in the last year (either for a

clinic visit, emergency room visit or inpatient admission) or 2 prescription fills for albuterol in the last year were identified at the two recruitment sites. Participants for the study had to be caregivers of children between 2 and 10 years of age with a history of asthma, wheezing or reactive airway disease or breathing problems but otherwise healthy and not disabled; English-speaking; possess an e-mail address and have access to the internet at home or at work. For participant flow chart see Figure 1

The study was approved by the Institutional Review Boards of the University of Washington and Seattle Children's Hospital. After consenting to be part of the study, care givers were sent an e-mail to request they fill out an online baseline survey.

Baseline Survey—The baseline survey assessed:

Socio-demographics variables—Participants were asked their child's age, gender and race as well as their own age and highest level of education.

Asthma-related questions—Participants were asked if their child was on any controller medication, with pictures of the medications used to prompt parents who were unsure, and how often the controller medication was used. Children were deemed "adherent" if the parent reported that controller medication was given at least 5 times a week. Parental report of frequency of daytime and nighttime symptoms and quick reliever use were used to classify children as mild intermittent, mild persistent, moderate persistent or severe persistent, based on the National Asthma Education and Prevention Program guidelines.

Outcome expectations, self-efficacy and stages of change—Using 5-point Likert scale questions, participants were asked to rate how strongly they agreed with two statements regarding outcome expectations of daily controller use and one statement about their level of confidence in giving daily controller medication; Taking controller medication every day helps make my child's asthma better; I'm concerned about the side effects of controller medicines; If I decided to give my child a controller medicine every day, I am confident that I could do it. To assess stage of change participants were asked which statement best described their feelings about giving their child daily controller medication "I am not thinking about giving my child controller medication every day", "I am thinking about giving my child controller medication every day"; "I am planning on starting to give my child controller medication every day"; "I am giving my child controller medicine every day"

Internet questions—Participants were asked to rate their attitude toward using computers on a four-point Likert scale; how concerned they are about their privacy when providing personal information on the internet; how often they used the internet; and how often they looked for information about their child's health on the internet.

Main Outcome

The main outcome for this analysis was engagement in the My Child's Asthma intervention, measured by adding the number of times a participant had logged onto the website and submitted the survey (which indicated that they also had received the minimal intervention content (i.e. feedback on child's progress and goals). For purposes of analysis we grouped those participants who completed all five monthly sessions together (super-engagers) and compared them to those who completed fewer than five sessions (not super-engagers).

Intervention procedures

After completing the baseline survey, participants in the intervention group received tailored feedback regarding their child's asthma symptom control and medication compliance, as well as assistance and encouragement in goal-setting around controller use if indicated. Over the following 5 months, intervention participants received monthly email reminders to go to the website, fill out a study survey and receive tailored feedback. Survey responses for each visit were used in the intervention part of the program by providing feedback to parents about their child's asthma, their own actions in asthma control activities or their success (or lack thereof) of completing stated goals. Survey items were also used to encourage parents to seek out more information on certain content areas (based on their responses in the survey). Control participants completed a similar survey and feedback cycle on a monthly basis, but with content that was not asthma-related. Only participants randomized to the intervention website (asthma-related website) are included in this study.

All surveys were completed online and participants were paid \$5 per survey (at the end of the study period).

Analysis

Statistical analyses were performed using the R statistical package version 2.10. [20] For descriptive analysis, we calculated means and standard deviations for continuous variables, counts and frequencies for categorical variables. We used t-tests to compare continuous variables between engagement groups, and Chi-squared test to compare categorical variables across engagement groups.

Results

Table 1 portrays the sample characteristics for participants randomized to the My Child's Asthma website. Most of the participants in the study were female (and the mother of the child), Caucasian, between 35 and 45 years of age and with at least some college education. Most of the children were classified as "mild intermittent" and on controllers. Only about one-third of children who were on controllers were classified as "adherent" to this medication. A slight majority of parents returned to visit My Child's Asthma at all five time-points after the baseline visit (161, 56.89%), and were thus classified as "super-engagers" for this analysis.

Table 1 also shows the pattern of engagement for the entire sample. The majority of participants engaged in all five monthly follow-up sessions, although 11% of participants logged on only once. The pattern of drop out is monotone, no parent skipped a visit and returned to the site for a later visit.

The comparison between super-engagers and non super-engagers (Table 2) showed that demographic variables were not strongly associated with engagement. Only age was statistically significantly associated with engagement with younger parents more likely to be super-engagers than older parents. Table 3 showed that controller use and being adherent to the medication was positively related to being a super-engager. Positive outcomes expectations and high self-efficacy beliefs were also positively related to being a super-engager with super-engagers reporting greater health benefits of daily controller use and greater confidence in their ability to give controller medication every day than those who were not super engagers. Stage of change was also positively related to being a super-engager with super-engagers reporting significantly more often that they were already giving daily controller medication than non super engagers. Internet variables were not significantly related to engagement.

Table 2 also shows the comparison between super-engagers and those who logged on only once. The child's race and parent's age and education were significantly related to logging on only once with parents of non-Caucasian children, older parents and parents with less education more likely not to return to the website. Table 3 showed that parents who reported less controller use and adherence among users were also more likely not to return to the website. These parents also reported less positive outcome expectations regarding health benefits of controller use and were more likely to be in the early cognitive (pre-contemplation or contemplation) stages of behavior change. Interestingly, these parents were less likely to report they were concerned about side effects of controller use than super engagers (48% vs 63%). In terms of internet use, parents who logged on only once reported significantly less frequent use of the internet than parents who logged on to all sessions.

A comparison of factors predicting engagement among the group of parents with children whose asthma was not controlled at baseline did not show any statistically significant differences between super-engagers and non super-engagers other than race. Parents/care-givers who reported a child of Caucasian race were more likely to be a super-engager than those reporting other races. (data not shown).

Discussion

The objective of this study was describe parents of children with asthma who engaged with a web-intervention to improve asthma control at the recommended intervals and compare them with their less engaged counterparts. The results show that having a child on controller medication and adherence to this medication was an important predictor of being a super-engager in the My Child's Asthma web-based intervention. Positive outcome expectations and high self-efficacy beliefs regarding controller use was also predictive of engagement. This suggests that parents who believe that daily controller use is beneficial for their child's health and whose child's asthma is already well controlled are more likely to stay engaged than parents who do not believe that daily controller medication benefits their child's health and whose children are not optimally controlled. This is consistent with the literature that suggests that health information seekers are generally more health-oriented than those who do not seek this information from the internet or other sources.[11]

Of the demographic variables, age was statistically significantly related to engagement with younger parents more likely to be super-engagers than older parents and race was almost statistically significantly related. Future web-based interventions need to focus specifically on how to engage older and non-white participants.

The results did not support a statistically significant association between computer/internet variables and engagement with the website. The large majority of participants reported a positive attitude toward the internet and the majority reported daily use of this channel. In addition, only a handful of participants reported anything less than high-speed access. Although the "new digital divide" has been referred to as the divide between those with high speed versus dial-up [2], the results of this study do not support this divide in the study community. It is possible that the biases involved in speed of internet connection or attitude toward this medium plays a greater role in enrollment of the study than engagement with the study's website.

Early Drop-outs

Controller non-use and less positive outcome expectations were related to abandoning the web-based intervention after the first visit. Interestingly, concern about side effects of controller use was greater in the super-engager group with more polarized answers than the early drop-outs who were more likely to report they "didn't know". It is possible that parents

who engaged more fully in the intervention were motivated to seek out more information because of their concerns. These parents believed controller use would benefit their child but concerns about side effects may have made them more active as information seekers. Future research should focus on how to stimulate motivation to engage in information seeking among less involved parents.

In addition, less formal education, being older and reporting lower use of the internet as a communication channel in general also was related to dropping out of the sessions after the first visit. This suggests that continued engagement with web-based interventions might be most effective for participants who have familiarity with the internet. Ritterband and colleagues [21] include user characteristics as predictor variables into their theoretical behavior change model for Internet interventions. They argue that modifiable characteristics can be targeted for change along with the identified problem. This suggests that study participants with negative health beliefs regarding the recommended behavior change or the chosen communication channel will need additional attention or intervention to enhance their engagement with the web-content.

There were no significant differences between super-engagers and non-super engagers (other than race of the child) for the group of parents whose children were not controlled optimally at baseline. This group was the main target for the intervention since behavior change would result in greatest health benefits for their children.

Limitations

Engagement was measured by adding the number of visits parents returned to the My Child's Asthma website. This does not include a measure of understanding of the material or a measure of engaging with additional web-based content. However, the visit was only recorded into the database if parents filled out the requested information and read through the feedback sheet (which was created each month based on the responses to the survey). As such, all visits included exposure to minimal intervention content.

Outcome expectations, self-efficacy beliefs and attitudes toward computers and internet were all measured with single-item measures. Single-item measures can cause measurement error which can attenuate the effect size of the variable. Since these survey questions were part of a large, structured assessment, the number of additional items had to be limited. Future research should include validated scales of beliefs and attitudes to increase predictive power of the constructs.

Last, the number of patients in need of regular controller use was small and therefore the analysis may be underpowered. However, it is worth noting that the subjects with stronger symptoms at baseline may not represent the entire population in need as many subjects who appeared not needing regular controller use with mild symptoms were simply because they were using controller regularly already. In addition, we intended the eHealth program to be for a wider audience. We wanted to encourage parents whose children were already on regular controller use for their asthma to stay adherent."

Conclusion

The objective of this paper was to explore factors that are related to engagement over time with an interactive web-program designed to help parents manage their child's asthma. The "super engagers" (those who logged on for all five follow-up sessions) were more likely at baseline to be adherent to asthma medication and had positive outcome and self-efficacy beliefs around asthma management. Maybe more interesting than that is that none of the demographic or computer/internet related variables were related to engagement with this

channel for health information, although this was not the case for participants who logged on only once. These individuals were younger, less educated, less likely to report their child as Caucasian and reported using the internet less often than the participants who logged on all five sessions

The results of this study further show that asthma management behaviors, positive outcome expectations and high self-efficacy beliefs regarding use of controller medication were related to engagement in the web-based intervention. It's possible that for those parents management of their child's asthma was already very salient and the web-based intervention was yet another tool to help them monitor and manage their child's condition. It will be important for future interventions to increase the relevance of the web-based content for parents who are not yet engaging in recommended behaviors and/or who report less positive outcome and efficacy expectations around asthma management. For this group of individuals intervention characteristics may need special attention to affect continued engagement. In a recent review on intervention characteristics that are related to engagement in web-based programs, peer and counselor support, email/phone contact and updates of the website are related to greater exposure to web-based intervention content. [22] It is important to conduct more formative research on the interaction between individual characteristics and intervention characteristics to increase engagement of individuals who are less likely to be engaged with web-based interventions.

References

1. Wantland DJ, Portillo CJ, Holzemer WL, Slaughter R, McGhee EM. The effectiveness of web-based vs non web-based interventions: a meta-analysis of behavioral change outcomes. *J Med Internet Res*. 2004; 10;6(4):e40.
2. PEW/Internet and American Life Project. Digital Divisions. There are clear differences among those with broadband connections, dial up connections, and not connections at all to the internet. October 5. 2005 <http://www.pewinternet.org/>
3. Ryhanan AM, Siekkinen M, Rankinen S, Korvenranta H, Leino-Kilpi H. The effects of internet or interactive computer-based patient education in the field of breast cancer: A systematic literature review. *Patient Educ Couns*. 2009 Sept 8. [Epub ahead of print].
4. Jackson CL, Boten S, Brancati FL, Batts-Turner ML, Gary TL. A systematic review of interactive computer-assisted technology in diabetes care, interactive information technology in diabetes care. *J Gen Intern Med*. 2006; 21(2):105–10. Epub 2005 Dec 22. [PubMed: 16390512]
5. Christensen H, Griffiths KM, Farrer L. Adherence in Internet interventions for anxiety and depression. *J Med Internet Res*. 2009; 24 11(2):e13. [PubMed: 19403466]
6. Dumrongpakapakorn P, Hopkins K, Sherwood P, Zorn K, Donovan H. Computer-mediated patient education: opportunities and challenges for supporting women with ovarian cancer. *Nurs Clinics of North America*. 2009; 44(3):339–54.
7. Myung SK, McDonnell DD, Kazinets G, Seo HG, Moskowitz JM. Effects of Web- and computer based smoking cessation programs: meta-analysis of randomized controlled trials. *Archv Intern Med*. 2009; 25(169(10)):929–37.
8. Runge C, Lecheler J, Horn M, Tews JT, Schaefer M. Outcomes of a web-based patient education program for asthmatic children. *Chest*. 2006; 129(3):581–93. [PubMed: 16537855]
9. Krishna S, Francisco BD, Balas EA, Konig P, Graff GR, Madsen RW. Internet-enabled interactive multimedia asthma education program: a randomized trial. *Pediatrics*. 2003; 111(3):503–10. [PubMed: 12612228]
10. Chan DS, Callahan CW, Hatch-Pigott VB, Lawless A, Proffitt HL, Manning NE, Schweikert M, Malone FJ. Internet-based monitoring and education of children with asthma is comparable to ideal office-based care: results of a 1-year asthma in-home monitoring trial. *Pediatrics*. 2007; 119(3):569–78. [PubMed: 17332210]
11. Dutta-Bergman MJ. Primary sources of health information: comparisons in the domain of health attitudes, health cognitions and health behaviors. *Health Comm*. 2004; 16(3):273–88.

12. Danaher BG, Seeley JR. Methodological issues in research on web-based behavioral interventions. *Ann Behav Med*. 2009 Published online:06 October.
13. Danaher BC, Boles SM, Akers L, Gordon JS, Severson HH. Defining participant exposure measures in web-based health behavior change programs. *J Med Internet Res*. 2006; 30(8):e15. [PubMed: 16954125]
14. Strecher VJ, McClure J, Alexander G, Chakraborty B, Nair V, Konkel J, et al. The role of Engagement in a Tailored Web-based smoking cessation program: Randomized Controlled Trial. *J Med Internet Res*. 2008 Oct–Dec.10(5)
15. Glasgow RE, Nelson CC, Kearney KA, Reid R, Ritzwoller DP, Strecher VJ, et al. Reach, engagement, and retention in an internet-based weight loss program in a multi-site randomized controlled trial. *J Med Internet Res*. 2007 Apr–Jun.9(2)
16. Hasson H, Brown C, Hasson D. Factors associated with high use of a workplace web-based stress management program in a randomized controlled intervention study. *Health Educ Res*. 2010; 25(4):596–607. [PubMed: 20150531]
17. Van 't Riet J, Crutzen R, De Vries H. Investigating predictors of visiting, and revisiting an online health-communication program: a longitudinal study. *J Med Internet Res*. 2010; 12(3):e37. [PubMed: 20813716]
18. Prochaska, JO.; Redding, CA.; Evers, KE. The Transtheoretical model and Stages of Change. In: Glanz, K.; Rimer, BK.; Lewis, FM., editors. *Health Behavior and Health Education: Theory, Research and Practice*. 3. Jossey-Bass; 2002.
19. Bandura A. Health Promotion by social cognitive means. *Health Educ & Beh*. 2004; 31(2):143–64.
20. R Development Core Team . R: A language and environment for statistical computing. R Foundation for Statistical Computing; Vienna, Austria: 2009. URL <http://www.R-project.org>
21. Ritterband LM, Thorndike FP, Cox DJ, Kovatchev BP, Gonder-Frederick LA. A behavior change model for internet interventions. *Ann Behav Med*. 2009 October. published online.
22. Brouwer W, Kroeze W, Crutzen R, de Nooijer J, de Vries NK, Brug J, Oenema A. Which intervention characteristics are related to more exposure to internet-delivered healthy lifestyle promotion interventions? A systematic review. *J Med Internet Res*. 2011; 13(1):e2. [PubMed: 21212045]

Summary Points

What was already known on the topic?

- Internet-based interventions have great potential to reach large audiences with tailored health information
- Internet-based interventions suffer from lack of uptake or engagement with the medium, possibly reducing impact of intervention
- Demographic characteristics such as gender, age, health behaviors and health motivation have been related to engagement in web-based health interventions

What this study added to our knowledge

- Outcome expectations and self-efficacy beliefs about the behavior of interest was related to engagement with an asthma-web based intervention
- Participants who logged on only once were younger, less educated, less likely to report their child as Caucasian and reported using the internet less often than the participants who logged on all five sessions
- The results of this study further show that asthma management behaviors were positively related to engagement in the web-based intervention

Fig. 1.

Table 1

Sample characteristics of My Child's Asthma participants

Variables	Population (N=283)*
DEMOGRAPHIC CHARACTERISTICS	
Child age in years mean(sd)	6.22 (2.51)
Child sex	
Male	182 (64%)
Female	101 (36%)
Child race	
Asian	19 (7%)
Black	19 (7%)
Hawaiian	1 (0%)
Hispanic	4 (1%)
Multi-racial	41 (14%)
Native American	1 (0%)
White	198 (70%)
Relation to child	
Mother	249 (88%)
Father	28 (10%)
Other	6 (2%)
Age range of parent	
<26	6 (2%)
26–35	96 (34%)
36–45	145 (51%)
46–55	29 (10%)
>55	6 (2%)
Highest level of education	
No college	49 (17%)
Some college	99 (35%)
Bachelor degree	69 (25%)
Graduate degree	64 (23%)
ASTHMA CHARACTERISTICS	
Severity at first visit	
Mild intermittent	212 (75%)
Mild persistent	47 (17%)
Moderate persistent	18 (6%)
Severe persistent	6 (2%)

Variables	Population (N=283) *
Use quick-relief medicine	
No	27 (10%)
Yes	242 (90%)
Any controller use	
No	114 (43%)
Yes	152 (57%)
Adherent to controller use	
No	173 (65%)
Yes	93 (35%)
PARENT BELIEFS AND ATTITUDES	
Positive outcome expectation	
Disagree	65 (24%)
Do not know	83 (31%)
Agree	118 (44%)
Negative outcome expectation	
Disagree	45 (17%)
Do not know	61 (23%)
Agree	160 (60%)
Self-efficacy	
Disagree	22 (9%)
Do not know	36 (14%)
Agree	208 (78%)
Stage of change	
Not thinking about it	122 (50%)
Thinking about it	28 (11%)
Planning on giving	9 (4%)
Giving	86 (35%)
Attitude toward computers	
Very much dislike	2 (1%)
Do not like	50 (18%)
Like a little	231 (82%)
Like very much	0 (0%)
How concerned are you about privacy?	
Not at all concerned	18 (6%)
A little concerned	148 (52%)
Very concerned	111 (39%)
Never provide personal information	6 (2%)

Variables	Population (N=283) *
How often do you currently use the internet?	
Not at all	11 (4%)
Less than once a week	31 (11%)
A few times a week	86 (30%)
Almost everyday	155 (55%)
How often do you check information online?	
Not at all	58 (21%)
Less than once a week	201 (71%)
Once a week	14 (5%)
More than once a week	9 (3%)
PARENT ENGAGEMENT IN INTERVENTION	
Engagement in visits after baseline assessment (visit 1)	
Visit 1 only	31 (11%)
Visits 1 and 2	28 (10%)
Visits 1 through 3	12 (4%)
Visits 1 through 4	51 (18%)
Visits 1 through 5	161 (57%)

* Some frequencies do not sum up to 283 due to missing responses.

Table 2

Demographic comparisons between parents who were super-engagers in My Child's Asthma and parents who were non super-engagers and between parents who were super-engagers and parents who logged on only once (low engagement)

	Super-engagers (all 5 visits)		Super-engagers vs. not		Super-engagers vs. low	
			Not super-engagers (visits 1-4)	P-value	Low-engagement (visit 1 only)	P-value
N	161		122		31	
Child age in years	6.04 (2.50)		6.46 (2.51)	0.168	6.19 (2.47)	0.759
Child gender						0.771
Male	110 (68%)		72 (59%)	0.106	22 (71%)	
	51 (32%)		50 (41%)		9 (29%)	
Child race:				0.072		0.025
Asian	6 (4%)		13 (11%)		4 (13%)	
Black	8 (5%)		11 (9%)		4 (13%)	
Hawaiian	1 (1%)		0 (0%)		0 (0%)	
Hispanic	1 (1%)		3 (2%)		2 (6%)	
Multi-racial	27 (17%)		14 (11%)		3 (10%)	
Native American	1 (1%)		0 (0%)		0 (0%)	
White	117 (73%)		81 (66%)		18 (58%)	
Child ethnicity				0.178		0.095
Black	8 (5%)		11 (9%)		4 (13%)	
Non-black	153 (95%)		111 (91%)		27 (87%)	
Asthma severity at baseline				0.891		0.674
Mild intermittent	123 (76%)		89 (73%)		22 (71%)	
Mild persistent	26 (16%)		21 (17%)		6 (19%)	
Moderate persistent	9 (6%)		9 (7%)		3 (10%)	
Severe persistent	3 (2%)		3 (2%)		0 (0%)	
Age range of parent				0.022		0.036
<26	2 (1%)		4 (3%)		2 (6%)	

		Super-engagers vs. not		Super-engagers vs. low	
		Super-engagers (all 5 visits)	Not super-engagers (visits 1-4)	Low-engagement (visit 1 only)	P-value
26-35		65 (41%)	31 (25%)	6 (19%)	
36-45		75 (47%)	70 (57%)	20 (65%)	
46-55		17 (11%)	12 (10%)	2 (6%)	
>55		1 (1%)	5 (4%)	1 (3%)	
Parent education					0.023
No college		24 (15%)	25 (21%)	11 (37%)	
Some college		60 (37%)	39 (32%)	11 (37%)	
Bachelor degree		36 (22%)	33 (28%)	5 (17%)	
Graduate degree		41 (25%)	23 (19%)	3 (10%)	

Table 3

Comparisons between parents who were super-engagers in My Child's Asthma and parents who were not super-engagers who logged on only once (low engagement) for beliefs, attitudes and behaviors related to asthma-management

	Super-engagers vs. not		Super-engagers vs. low	
	Super-engagers (all 5 visits)	Not-super-engagers (visits 1-4)	Low engagement (visit 1 only)	P-value
Any controller use	100 (65%)	52 (47%)	11 (41%)	0.019
Adherent to controller use (among controller users)	67 (67%)	26 (50%)	5 (45%)	0.155
Positive outcome expectation:				0.003
Disagree	38 (25%)	27 (25%)	5 (19%)	
Do not know	37 (24%)	46 (41%)	15 (56%)	
Agree	80 (51%)	38 (34%)	7 (26%)	
Negative outcome expectation:				0.028
Disagree	30 (19%)	15 (14%)	3 (11%)	
Do not know	28 (18%)	33 (30%)	11 (41%)	
Agree	97 (63%)	63 (57%)	13 (48%)	
Self-efficacy:				0.774
Disagree	11 (7%)	11 (10%)	1 (4%)	
Do not know	14 (9%)	22 (20%)	3 (11%)	
Agree	130 (84%)	78 (70%)	23 (85%)	
Stage of change:				0.01
Not thinking about it	72 (46%)	50 (56%)	14 (56%)	
Thinking about it	15 (10%)	13 (14%)	7 (28%)	
Planning on giving	4 (3%)	5 (6%)	1 (4%)	
Giving	64 (41%)	22 (24%)	3 (12%)	
How would you rate your attitude toward computers?				0.425
Very much dislike	1 (1%)	1 (1%)	1 (3%)	
Do not like	27 (17%)	23 (19%)	5 (16%)	
Like a little	133 (83%)	98 (80%)	25 (81%)	

		Super-engagers vs. not		Super-engagers vs. low	
		Super-engagers (all 5 visits)	Not-super-engagers (visits 1-4)	P-value	P-value
		0 (0%)	0 (0%)		
Like very much					
How concerned are you about privacy?					0.19
Not at all concerned		13 (8%)	5 (4%)	0.484	0 (0%)
A little concerned		80 (50%)	68 (56%)		15 (48%)
Very concerned		63 (40%)	46 (38%)		14 (45%)
Never provide personal information		3 (2%)	3 (2%)		2 (6%)
How often do you currently use the internet?					0.025
Not at all		5 (3%)	6 (5%)	0.597	1 (3%)
Less than once a week		15 (9%)	16 (13%)		9 (29%)
A few times a week		49 (30%)	37 (30%)		8 (26%)
Almost everyday		92 (57%)	63 (52%)		13 (42%)
Several times a day		0 (0%)	0 (0%)		0 (0%)
How often do you check information online?					0.667
Not at all		33 (21%)	25 (20%)	0.943	6 (19%)
Less than once a week		113 (71%)	88 (72%)		24 (77%)
Once a week		8 (5%)	6 (5%)		1 (3%)
More than once a week		6 (4%)	3 (2%)		0 (0%)