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Abstract

Children with asthma and allergies experience social isolation and gaps in social support particularly from peers. The objective of this pilot study was to design and test an accessible online support intervention for these children. Children ($n = 27$) aged 7 to 11 from across Canada participated. GoToMeeting was employed for the support group sessions and Club Penguin for social connections during and between support group meetings. Content included: strategies for coping with asthma and allergies, role playing and games to help children deal with difficult situations, fun and enjoyment, and presentations by positive role models. Participation in the online peer support intervention was high, 86.3% on average over the 8-week intervention. By sharing their experiences, listening to peers' experiences, and role playing, children were introduced to practical skills: problem solving, communicating, seeking support, and self-advocacy.

Keywords

asthma, children, online support intervention, peer support, pilot study

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At least 12% of children globally are affected by asthma and 80% of children with asthma have allergies (Global Initiative for Asthma [GINA], 2010). For most children, asthma and severe allergies can be controlled by avoiding exposure to allergens and adhering to prescribed medication regimes (Boulet et al., 2008; GINA, 2010). However, over half (56%) of children and adults with asthma have uncontrolled exacerbations every year (Rosychuck et al., 2010; To et al., 2006). Asthma is the most common cause of preventable hospitalization in children (Boulet et al., 2008; Rosychuck et al., 2010).

Asthma and severe allergies place a major burden on children in terms of physical health problems, anxiety, depression, medication costs (Boyd et al., 2010; GINA, 2010; Li & Newcomb, 2009), missed school, and poor quality of life (Akeson, Worth, & Sheikh, 2007; Cummings, Knib, King, & Lucas, 2010; Kastner, Harada, & Wasserman, 2010; Mangan, Wittich, & Gerald, 2007). There is a complex relationship between psychosocial factors and the management of asthma and allergies (Boyd et al., 2010; Newcomb, McGrath, Covington, Lazarus, & Janson, 2010). Children want their life to be “as normal” as other children, and do not like the restrictions imposed by avoiding asthma and allergy triggers (Newcomb et al., 2010; Protudjer, Kozyrskyj, Becker, & Marchessault, 2009). They hide their condition from peers, refuse to take medication in public, are reluctant to seek assistance, and lack social support (Kastner et al., 2010; Penza-Clyve, Mansell, & McQuaid, 2004; Yang, Sylva, & Lunt, 2009).

Social support and children’s psychosocial environments explain more variance in children’s quality of life than knowledge about asthma (Boyd et al., 2010; Goldbeck, Koffmane, Lecheler, Thiessen, & Fegert, 2007; Sin, Kang, & Weaver, 2005; Vila et al., 2003). Children must learn to avoid triggers, identify symptoms, seek support from people in their social networks (e.g., peers, teachers, coaches) and rely on other people to assist with self-management (Bravata et al., 2009; Protudjer et al., 2009; Yorke, Flemming, & Shuldham, 2007). Asthma and allergy education programs emphasize medical and family management rather than children’s role in managing their own condition (Boyd et al., 2010; Newcomb et al., 2010; Yorke et al., 2007). Smith’s (2005) review of psycho-educational interventions for children with difficult asthma noted that few emphasize problem solving training, social skills training, or trigger management, and fun activities like games or puzzles are rare. The majority were taught by health professionals and only 3.8% were led by a peer or lay person. Yet, interventions do not focus on the support needs or preferences of children with asthma and allergies (Rhee et al., 2010; Stewart, Letourneau, Masuda, Anderson, McGhan, 2011a, 2011b; Yang, Sylva, & Lunt, 2010).

Children are increasingly turning to the Internet to meet friends on social networking sites and find information to manage chronic health conditions (Bennett & Glasgow, 2009; Han & Belcher, 2001). Internet technology can be used to increase interactions among children with similar conditions and reduce isolation and depression in isolated populations (Bennett & Glasgow, 2009; Eyesenbach, Powell, Englesakis, Rizo, & Stern, 2004; Murray, Kerr, Stevenson, Gore, & Nazareth, 2006). However, interactive computer programs for children are rare and focus on individualized health education rather than social support (Bennett & Glasgow, 2009; Smith et al., 2005). Few online support interventions are targeted at adolescents (Stinson, Wilson, Gill, Yamada, & Holt, 2009) and none have been tested with young children who have chronic health conditions. Moreover, participants' perceptions of the intervention are typically not elicited and intervention processes are rarely explicated or evaluated (Boyd et al., 2010; Gottlieb & Bergen, 2010; Stinson et al., 2009).

To address these research and practice gaps, our nurse-led interdisciplinary team developed, implemented, and evaluated an online peer support program for children with asthma and allergies. The objective of the larger, mixed-methods study was to design and test an online peer support intervention for children with asthma and severe allergies. This article focuses on insights from participants' children, and peer helpers' and the children's parents' perspectives on the successes and limitations of the online support program and on the support intervention processes. Four research questions guided the study reported in this article:

1. What types of support were provided in an online support program for children with asthma and allergies?
2. What intervention processes were observed in the online support intervention?
3. What were the key ingredients of the intervention?
4. What factors influenced the success of the intervention?

Intervention Design and Implementation

This pre- and posttest pilot intervention study used a participatory mixed-methods research design (Stewart, Makwarimba, Barnfather, Letourneau, & Neufeld, 2008). Participatory research is particularly pertinent for addressing social determinants of health (Cargo & Mercer, 2008). Ensuring that participants' life situations and challenges are understood and addressed in the intervention enhances the relevance of intervention to changing behavior (Heenan, 2004). Moreover, as Baker, White, and Lichtveld (2001) note,

participatory strategies expand potential application of research knowledge to programs and practice.

We conducted telephone interviews using semistructured qualitative interview guides with children aged 7 to 12 years who have asthma and allergies ($n = 20$) and parents of these children ($n = 44$) to determine support needs and intervention preferences. Both parents and children wanted a support program that was accessible, comprehensive, and reliable. Specifically, they provided information regarding who might attend, what content would attract children, who the intervention agent/helpers should be, and when sessions should be scheduled. While most parents and children initially said they wanted face-to-face support, there were significant barriers to participation in face-to-face groups including children's and parents' busy schedules, lack of transportation, required child care for siblings, and geographic distance from peers. Consequently, discussion of the feasibility of varied intervention options revealed that most parents and children thought Internet support would be useful, accessible, and address their support needs more efficiently than traditional face-to-face support and education programs.

Conceptual Foundation for Intervention

Social support is a key resource for coping with chronic conditions like asthma and allergies and influences health status, health behavior, and the use of health services (Stewart, 2000; Uchino, 2004). Social support is conceptualized in this study as interactions that can improve support-seeking coping, reduce stresses, and decrease loneliness (Rhee et al., 2010; Stewart, 2000). Individuals with chronic health conditions often have limited social networks, are socially isolated, socially excluded, and lack social support (Goldbeck et al., 2007; Kyngas, 2004). For many children with asthma and allergies, reducing social contacts and avoiding social situations where allergens may be present are necessary strategies (Houle, Leo, & Clark, 2010; Protudjer et al., 2009). To compensate, social support can supplement depleted social networks. Support-seeking coping is a strategy used to increase social networks and receipt of support. Support from peers is particularly important as children place high value on friendships. Peer support can reinforce self-confidence, and increase self-esteem and social competence (Boothroyd & Fisher, 2010; Nicholas et al., 2009). Based on our previous support intervention studies, three social processes are predicted within the children's support groups: social exchange, social comparison, and social learning (Barnfather, Stewart, Magill-Evans, Ray, & Letourneau, 2011; Stewart, Masuda et al., 2011). Social exchange theory predicts that as relationships develop among the children, their peer mentors,

and the professional, sharing would be evident in their exchanges. In social comparison theory, individuals compare their situation and themselves to others. According to social learning theory, role models and modeling are fundamental concepts to developing children's self-confidence and self-efficacy. Peers with experiential knowledge of asthma and allergies are resources for social learning.

Sample

Participants in the intervention met the following inclusion criteria: (a) physician-diagnosed asthma and or severe allergies, (b) 7 to 12 years of age, and (c) English speaking. Children were recruited via posters distributed at schools and email invitations were sent out via relevant association mailing lists (e.g., Asthma Society of Canada, Asthma and Allergy Information Association, Anaphylaxis Canada). Children who were interviewed in the initial assessment phase ($n = 20$) (Stewart, Letourneau et al., 2011a, 2011b) and who met these inclusion criteria ($n = 9$) were invited to participate. Two years elapsed between the assessment and intervention, thus many of children interviewed in the assessment phase had aged up. Child participants provided signed assent and their parents provided signed consent. The study received ethical approval from the University ethics board.

Twenty-seven children aged 7 to 11 (mean age 9.26) took part in the children's support online group intervention. Twenty resided in urban area and seven lived in small towns or rural areas. The modal family size was 2 children. The children's parents were well educated; over 90% had completed college or university. Household income was high; the majority of families had family incomes of over US\$100,000. Participants received Club Penguin (described below) memberships upon completion of the postintervention interview. Three children participated in two or fewer support sessions because of scheduling conflicts with family events or recreational activities.

Intervention

The support intervention was designed based on the support intervention preferences of parents ($n = 35$) and children ($n = 20$) articulated in the preintervention interviews (Stewart, Letourneau et al., 2011a, 2011b). Parents and children regarded online support as a feasible weekly intervention that would involve other children who have asthma and allergies, adolescents with asthma and allergies as peer supporters, and professional consultants. They wanted: (a) fun and enjoyment; (b) activities geared to the sex and age of

children; (c) support and education delivered by peer mentors and professionals on coping strategies; (d) presentations by positive role models; and (e) role playing/games to help children deal with difficult situations. As both children and parents were concerned about children's Internet safety, the online program was designed to be private and secure.

In the needs assessment interviews (Stewart, Letourneau et al., 2011a, 2011b), parents and children thought that choice of technology was less important than the substantive process of meeting and supporting peers. Ease of use, technical support, and capability for children to communicate were priorities. After reviewing varied online meeting and social networking options, the team selected GoToMeeting for the support group meetings and Club Penguin as a virtual space for the children to meet socially between group sessions. GoToMeeting, one of many online virtual meeting spaces, was pilot tested and selected because: (a) the interface requires minimal setup; (b) it is user-friendly for young children; (c) up to 15 participants could interact on the screen using drawing tools pen, highlighter, arrow and spotlight tools, share their computer's screen or PowerPoint, and chat with the entire group or privately; (d) meeting sessions (audio, chat, on-screen activity) could be recorded for evaluation; and (e) unlimited meetings and real-time support were available for participants and program staff. Club Penguin was selected because it was safe, offered activities and games, appealed to both boys and girls, and was fun. This Disney-owned social networking site is also familiar to many children with over millions of subscribers worldwide. The site is popular with parents as it offers a high degree of safety with site monitors who patrol the game and built in safe chat features. Children can chat and play games with online friends using their penguin Avatar.

Previous research (Han & Belcher, 2001; Meric et al., 2002; Patel, 2005) indicated that participants should be introduced to the technology before going online. Consequently, prior to the online support group launch, participants received training to ensure that children and parents were comfortable with the technology and two received GoToMeeting technical support.

Based on interventions with children who have other chronic conditions, weekly support for 8 weeks was selected as an ideal duration for this intervention study. Participants were offered a choice of five times suited to the children's and mentors' schedules. Group sizes ranged from four to eight participants. Weekly sessions lasted 45 to 120 min including the group time spent on Club Penguin. In addition, participants made one-one-one connections on Club Penguin between group sessions. The university ethics board approved the study. The children provided signed informed assent and their parents provided informed consent.

Intervention Agents: Peer Mentor and Health Professional

Five peer mentors, aged 13 to 20, were trained using: (a) peer support skills workbooks, (b) mentoring skills training sessions conducted on GoToMeeting, (c) pre- and postsession meetings with the health professional assigned to support the peer mentors, and (d) a mid-session mentor meeting on GoToMeeting. Modules on social support, mentoring, team building, reflective listening, and problem solving were included in the workbooks. Two online training sessions consisted of an orientation session on the intervention purpose, social support processes, roles of peer mentors and the professional, and a mock support session focused on the technology, potential discussion themes, and components of peer support group sessions. Before each session, the youth mentors were introduced to session goals, proposed PowerPoint for the week's session, and potential questions to stimulate discussion. Postsession debriefing with peer mentors and professional consultant focused on successes and challenges of the session and plans for the next session. The mid-point training session began with mentors sharing successes and challenges and then focused on improving group processes (e.g., mentoring tips and tools).

Weekly sessions were based on content suggested by children and parents in the telephone interviews and needs of group participants. Themes delivered included: triggers for asthma and allergies and strategies to avoid triggers, dealing with social situations, communicating with others, and Olympic and celebrity role models with asthma and allergies. The health professional involved in the study had training in psychology and prepared PowerPoints and participant workbooks, in addition to supporting peer mentors and participants during the sessions. The eight sessions also emphasized role playing and games to help children deal with difficult situations, enjoyment, and presentations by positive role models. The children's group discussion content themes are summarized in Table 1.

Data Collection

Demographic data including birth date, family income, age of asthma, and allergy diagnosis were collected via self-report. Qualitative data pertaining to intervention processes were elicited through session recordings, emails from participants, and posttest interviews with participants, parents, and peer mentors. All qualitative data were from group sessions and interviews were digitally recorded. In-depth individual interviews with children, their parents, and group interviews with peer mentors were conducted within 1 month of the intervention by telephone by a graduate student who was trained in

Table 1. Support Session Themes and Facilitation Strategies.

Topics	Facilitative strategies
Session 1: What the group is about? Introductions	Introductions. Give children support to share how they feel about and deal with their asthma and allergies. Introduce support: "We can all help each other through sharing our feelings and experiences, offering suggestions, being encouraging, and making friends."
Session 2: What do you want to change about asthma and allergies?	Dreams and wishes: Have you ever wished upon a star? What are your asthma and allergy wishes? Sometimes wishes and dreams are about things we want to change in our lives. Like things that "bug" us! What bugs you about your asthma and allergies?
Session 3: How do I take control?	"What is a trigger?" Encourage brainstorming of children's ideas. Game: Put each of these triggers in the trash, say what the trigger is, how it affects us, and what we can do to feel better if we get triggered!
Session 4: How to seek support and communicate with others?	Role playing to manage everyday situations: facilitate understanding of their triggers and strategies in a restaurant role play situation. Encourage learning from each other and considering others' needs. Practice speaking with a stranger and an adult about one's needs around asthma/allergies.
Session 5: How to manage asthma and allergies in usual situations?	Birthday parties, sleepovers, sporting events, going on a penguin sleepover: What is good and not so good about going on a sleepover? Encourage sharing of asthma/allergies sleepover experiences and planning for activities like school, sports, birthday parties, sleepovers.
Session 6: How do I find support?	Introduce how to find support and comfort. Introduce experiences of what helped children to feel good. Ask for examples: Things that make you feel good inside, taken care of, and calm. People—you trust, who will give you a hug, talk to you, help you feel better. Places—that make you feel safe, calm, happy inside, where you like to be on your own or with someone special.
Session 7: Role models	Game: Which Olympic athlete has asthma and allergies? Discuss how even with asthma and allergies you can "Shoot for the Stars!" Do you have a hero? Have you ever dreamed of being an Olympian? Or a great pianist? Artist? Singer? Dancer? Other?
Session 8: What have I learned?	Children create PowerPoint or something to share with the group from their computer. (e.g., their experience of group or how they used learning from group sessions). Discussion with children if and how they may stay connected with each other.

qualitative interview techniques and transcribed verbatim. Semistructured interview guides elicited information from child participants on: types of support experienced in the program, strengths and weakness of the program, and suggested changes. Exemplar questions included: “Were your chats with other kids with allergies helpful? Is it any easier for now for you to be a kid with asthma and allergies? Did you help the other kids in your group? Did the other kids help you?” Interviews with parents asked about their own and their children’s satisfaction with the program, benefits and challenges of the program, suggested changes, and if the child participated on their own or required help (e.g., “How much help did your child need to participate? What changes would you make to the children’s online program?”). Posttest interviews with peer mentors were designed to draw out information on factors influencing intervention impact, peer support training, mentor roles, and recommended changes (e.g., “What types of support did you provide during the online conversations you had with the children? Were the training sessions for mentors helpful?”)

Data Analysis

The qualitative data on intervention processes taken from digital audio recordings of intervention sessions, and posttest in-depth interviews were analyzed using thematic content analysis (Hsieh & Shannon, 2005). Thematic content analysis may be used to identify the common themes in all forms of qualitative data, text, videos, and photographs. A preliminary coding framework based on the theoretical framework and research questions (e.g., types of support provided, support processes) guided two graduate students who read the interview transcripts, listened to recordings of the support intervention groups to become familiar with the data, and then took notes about types of support and support processes. Common themes and codes were identified across interviews and intervention data (recordings, transcriptions). Interrater reliability of coding by two graduate prepared research assistants was over 90%. As coding progressed, inductive analysis was used to identify new themes and codes that did not fit the deductive framework. To ensure qualitative rigor and trustworthiness, an audit trail of research was maintained by the project manager. The audit trail included: minutes of team meetings, field notes from intervention planning sessions, and training sessions with intervention agents (peers and professional), as well as records of contacts with children and their parents. The intervention agents, peers and health professional submitted weekly field notes that included their contacts with children during the week and their impressions of the weekly online support session.

Results

Participation in the online peer support intervention was consistently high—86.3% on average over the 8 weeks of the intervention. The majority of the children (96.2%) provided very positive feedback about the online peer support group. Most children said they would recommend the online support group to other children with asthma and allergies because it was helpful and fun. Perceived support from family and friends and support seeking coping increased following the intervention. Loneliness and social dissatisfaction decreased. Children confirmed that they felt less alone and more like other children following the online support program. They became more comfortable to talk about their asthma and allergies and seek assistance from others. This article focuses on intervention processes to enable adaptation and replication by nurse clinicians and researchers. Exemplar quotes from children, parents, and mentors are included in Table 2.

Types of Support Provided in Intervention (Research Question 1)

Information Support. The children gave concrete examples of information support including learning about triggers such as the benefits of allergen avoidance and new strategies such as placing asthma medication on night tables so “*I don’t forget*” or talking to friends or their teacher about their asthma/allergies. Children thought that the support group filled some gaps in their knowledge. They believed they received and provided practical information that made them feel more comfortable about managing their asthma and allergies. For example, one 9-year-old boy related, “*Every meeting I learned new things about how to manage my asthma. I sometimes wheeze—so my mentor told me about what she does. Well my asthma has been better.*”

Some children said they were not aware of symptoms, triggers, or medication regimes to reduce asthma symptoms prior to the intervention. They credited new information received during support sessions for enhanced feelings of well-being. Children acquired skills through the intervention including how to use the new information to solve problems and seek support. These children incorporated practical strategies from their peers and mentors into their day-to-day coping. Most children believed that they learned new techniques to handle social situations with peers, coaches, teachers, and parents. Many children were used to their parents managing their situations and thinking about how they would manage responsibility was a new experience.

Parents acknowledged that the children gained information, but also noted that their children’s confidence and empowerment was enhanced by interactions with peer mentors who helped make information relevant to their needs.

Table 2. Exemplar Quotes From Children, Parents, and Mentors.

Children with asthma and allergies	Parents	Mentors
Types of support provided in intervention (Research question 1)		
Information support		
<i>Just before the group happened, I was feeling left out of things, but when we did the trial, I got to know there was other people and when we had a meeting we told each other about our experiences. I remember one week we got to share about other people's experience and how they got to handle it and I really liked to hear how they handled it and the next time it happened to me, I tried using their methods. (11-year-old girl with allergies)</i>	<i>She was excited; she looked forward to Sunday every week. She became a lot more comfortable with her asthma and issues that might be around it and more diligent about taking her medication. It was good for self-confidence and self-esteem. (Mother of a 9-year-old daughter with asthma)</i>	<i>I had kind of the same thing—when we got to their presentation PowerPoints and they brought in past subjects and how it was relevant to their daily life. It showed they were committed to the group and helping out the group because they were bringing in past things like how they helped others, overcame their asthma and allergies. (Male mentor, 15 years of age)</i>
Emotional support		
<i>It really is a hard thing to have an allergy. Sometimes we may feel left out at birthday parties or special restaurants. It might even make you feel angry. But, I learned through these meetings that it's not that bad to have an allergy at all! (9-year-old girl with allergies)</i>	<i>She really enjoyed it. She liked connecting with other kids that have allergies. She does know other kids here in [city] that do, but not necessarily getting to know them as they have in this program that you put together. They really got to know each other. She enjoyed the different things that [mentor] went through, you know the different exercises where they pretended they were in a restaurant and had to order food and that sort of thing that they could do with their peers that were in the same situation. (Mother of a 10-year-old daughter with allergies)</i>	<i>Mostly I think they got emotional support. They could talk about what they had done in the group. I think they got to learn some new strategies with the role playing, but mainly they got to interact with others. Because they might not have other kids with asthma and allergies in their classes or their school. They won't feel so alone. Like there are 300 or 400 kids in my school and I am the only one with severe allergies. They got to learn from my experiences. (Female Mentor, 15 years of age)</i>
<i>I liked how you could talk openly and you didn't have to lie about anything and you could just speak your mind basically. (10-year-old girl with allergy and asthma)</i>		
Affirmational support		
<i>As I said, this year before the group started I wasn't invited to some birthday parties and one of the boys got really mad at me when I asked him to put away a peanut product. So I thought some of the things that were happening to [mentor] were just like mine, where some kids brought peanuts in and he told them to wash their hands. That definitely helped me a lot because I know it was something I could do. (11-year-old girl with allergies)</i>	<i>It was nice for her to see that other people were in her shoes, that what I think was the best part, to see that other people are dealing with the same things she was dealing with. You don't feel like you're alone. (Rural mother of 8-year-old daughter with allergies and asthma)</i>	<i>For me it was more information and affirmation—you know letting them know they are doing a good job and then I talked to them about a lot of different things. Up to Week 4, I was providing them information based on my experiences and towards the end, I was more affirmational, encouraging them to keep on doing the good things they were doing to overcome allergies and asthma. (Female mentor, 20 years of age)</i>

(continued)

Table 2. (continued)

Children with asthma and allergies	Parents	Mentors
Intervention processes (Research question 2)		
Social exchange		
<i>We got to share about other people's experiences and how they got to handle it and I really liked to hear how they handled it and the next time when it happened to me, I tried using their methods. There were so many people that were like me. (11-year-old girl with allergies)</i>	<i>It was nice for her to be in a supportive group, to see that other people were in her shoes, that's what I think was the best part; that other people were dealing with the same things as you. The group was really good. You don't feel like you're quite so alone. She doesn't talk about it a lot. (Mother of an 8-year-old daughter)</i>	<i>I think in my group the biggest benefit was being able to talk to others that were the same as them. There was one girl who was pretty shy, and by the last sessions, she was right in there. So everyone helped. It was really nice to see how they seemed to include everyone. (Female mentor, 20 years of age)</i>
Social learning		
<i>I think I learned how to deal with my allergies better and feel more comfortable knowing there are other kids like me dealing with them. (9-year-old girl with allergies)</i>	<i>Just talking to other kids and connecting with them and you know hearing their stories I think was important. I know some of the kids were older and I think that's good. It's always nice to be with other people that have the same issues. (Mother of an 8-year-old son with allergies and asthma)</i>	<i>My parents were a good support, but peer support makes a difference. I think the support we provide is different than parents—it's more on a friend level, it's not necessarily that we talk about different things, but we approach it differently. You bring up different things and talk about different things than you would with your parents. (Female mentor, 16 years of age)</i>
Social comparison		
<i>It gave me a lot more friends and they can't make fun of me because we have the same problem. Other kids make fun of me because I can't run as fast or I can run but I can't run for as long. If I didn't have asthma, I could beat them around the track 10 times, but because I have asthma, I am not so fast and stuff. It kind of made a difference. Now they understand that. (10-year-old girl with asthma and allergies)</i>	<i>It was nice for her to see that other people were in her shoes, that's what I think was the best part, to see that other people are dealing with the same things she was dealing with, you don't feel like you're quite so alone. She doesn't really talk about it a lot so it was good to have the group where she could talk. (Mother of 8-year-old daughter with allergies)</i>	<i>It's not kept in the dark any more, the children could be themselves. This program would have provided me with the information to deal with allergies, like when we had the slides on going out to a restaurant or sleepover or any other events, it would have boosted my confidence (Male mentor, 15 years of age)</i>
What were the key ingredients of the intervention? (Research question 3)		
Mentoring and positive role models: reduce loneliness and normalize asthma and allergies		
<i>I thought that [mentor] was very good at starting the conversation and some people didn't have any examples so he would give an example that got it going.</i>	<i>It was very good to have [name]. We were all so blown away with his articulate nature. I know that parents were thinking that this is where I want my child in Grade 8,</i>	<i>I gained a lot of information from the kids themselves, their stories and it made me understand that when I was little, I had the same questions as they did. It made me feel</i>

(continued)

Table 2. (continued)

Children with asthma and allergies	Parents	Mentors
<i>I remember on the first day, a number of people were shy, including me, so [mentor] would start the conversation and then give people ideas and then that happened to me too, so I can tell that story so then that got the ball rolling. There really needed to be someone to ask the questions and move it along and make it so that everyone had a turn, say what they really thought and helping everybody. (11-year-old girl with allergies)</i>	<i>so now we have something to shoot for in term of role models. Outstanding, knowledge, empathy, communication that he did. That young man is going to rule the world. That's what I was thinking. (Mother of an 11-year-old daughter with allergies)</i>	<i>good that I was helping them out. We provide friend support, we are perceived as someone they can talk to but with more knowledge, kind of like an idol almost. Like I remember for hockey, someone who is a bit older, you can still relate to but you can learn from too. (Male mentor, 13 years of age)</i>
What factors influence the success of the intervention? (Research question 4)		
Group format and meeting on the Internet		
<i>Helpful because they taught us if we had an allergy problem or an asthma one, they gave us ideas about what to do. I felt like that everything would be easier. I talked to everyone. I could talk about allergies or asthma. Then after we would go on Club Penguin and we meet some new friends. I have friends now that really support me. (8-year-old girl with severe asthma and allergies)</i>	<i>I thought it was an excellent idea. They were anonymous. As I said they are both very shy, so you know they were comfortable to open up. [9-year-old daughter] was very vocal during the meetings. It was well done. It wasn't too long; it just worked out well. (Mother of two daughters with allergies)</i>	<i>Some things are easier when you can't see your face, but it would have been easier to see face and body language. If they were together, you could see if they were going blank or just listening. That the one thing you can't tell if the kids are online listening and just curious. It was really hard for me to tell if they were understanding or just curious and listening. (Female mentor, 16 years of age)</i>
Fun		
<i>Well, I like pretty much everything I like. I like the way how it's set up. I like a lot of it! I like pretty much everything! Like I liked how we had a big conversation about everything and then we answered questions and everything and looked at stuff that was actually fun and then we. . . after went to Club Penguin. I really liked it. (8-year-old boy with asthma and allergies)</i>	<i>She loved it. She was really keen, she always wanted to be home for it so we would change our weekend schedule because it was important to her. She loved the relationships she developed with the other children. It was nice to see her reach out to a community affected by similar health issues and talking to people who knew what it is like living with the constraints that she has to live with. (Mother of 10-year-old daughter with anaphylaxis)</i>	<i>Some of them feel that they are always different, but I think Club Penguin made them feel like everybody else. It made the whole experience a lot more fun for them. I noticed that when we were involved in the youth study before this one, like I am not saying I would have liked to play Club Penguin, but I think it made it a lot more fun for the kids to take part in. (Male mentor, 13 years of age)</i>

Mentors reported that the children received and gave information, but not in a formal health education mode. Mentors thought the “information exchange” when children shared experiences in the support group session was a more effective way of transmitting information than written material.

Mentors believed exchanges between children and mentors made information personally relevant to the children. Although children discussed information when it was introduced, mentors believed it was particularly powerful when children told group members how they used the information.

Mentors noted that while some children were initially too shy to share their experiences, they were eager to answer and ask questions within the support group context. Peer mentors believed that children enjoyed deciding whether information received was relevant to their needs.

Emotional Support. Children recognized that emotional support, having a safe place where they could talk to others, share fears and triumphs, and receive encouragement were key components in this online support intervention. As the support group sessions progressed, children identified with others in their group and acknowledged how they were similar. In the posttest interviews, a few children empathized with other children who had more difficult problems to handle. The children were supportive of peers facing similar conditions and issues. In the online support intervention, mentors encouraged children to talk about their feelings and support needs. Children liked the role playing that prepared them to seek support from others such as friends, teachers, and coaches.

Children discussed how managing asthma and severe allergies was stressful with peers. They were worried about disclosing their condition and about reactions of other people to being breathless, use of prescribed medications, and missing sports or school because of illness. The children with food allergies were apprehensive about how their peers might treat them. Both boys and girls spoke about being supported emotionally by the group and feeling for the first time that they could be honest about their feelings and could talk about the problems they encountered.

Almost all parents said that their children enjoyed the freedom to share their concerns with other children in similar situations, and that these online relationships with illness peers were different than their offline friendships. Most parents believed the online support intervention was a positive experience for their children. This response from the mother of a 9-year-old boy was typical, *"He really enjoyed it, he's made some new friends and liked finding out about asthma. Just finding out what the other kids' experience was good."*

Mentors believed that their primary role was to provide emotional support and that this was the most valuable feature of the intervention. For some children, peer mentors were the only people other than parents who listened to them share their feelings about asthma and allergies. They assured children that mentors and other children in the group would understand and listen to them.

Affirmational Support. As they shared their challenges and solutions, children were surprised that their experiences were not unusual and they were not alone. Other support group members assured them that they too had been isolated or excluded from activities and affirmed that participants had handled tricky situations well. This affirmation helped participants recognize that they had the skills they needed to cope in their situation. Children thought that affirmation support including assurance that others experience the same problems was as important as emotional support. Children enjoyed other children's and peer mentors' encouragement that they were doing the right things to manage their condition and could handle negative reactions from other people.

One girl said the group helped her overcome low self-esteem caused by exclusion by school peers. The group discussions helped her understand that others faced similar circumstances and role modeling by mentors offered her alternate ways of dealing with the situation.

For many children, this was the first time they shared experiences with others who have asthma and allergies. Almost 25% of these children said they did not know any other children with asthma and allergies prior to the intervention, and another 25% said only a few children in their school had asthma or allergies. A few participants noted that although they knew children with allergies, none were as severe as theirs. For example, a 10-year-old boy with allergies and asthma commented, *"There are some people at school that have asthma, but no one with allergies. It feels bad."* Some mentors noted that that they were the only ones with anaphylactic allergies in small schools. For example, when a parent asked one peer mentor how others in her school handled allergies to nuts, she replied, *"I'm not sure. I'm about the only one in my school that has severe allergies, so I haven't really seen how other people deal with it."*

Parents believed that talking to peers confirmed that children's concerns were valid, they were doing well, and they could manage difficult situations. Parents said that children gained "comfort" and "security" from the online support group.

Mentors reported that the affirmation provided by themselves and group members helped the children believe that their experiences were not unusual. As the children compared peers' situation and reactions to their own, their life seemed more normal. One mentor noted that the types of social support provided evolved over the course of the intervention.

Intervention Processes (Research Question 2)

Social Exchange. The support group was a safe place to share feelings. Although the children were shy initially, by the third session they had

developed trust in the mentors and the group. Many children indicated that they finally felt accepted as part of a group of peers.

Most parents believed that by being able to talk to other children and being part of a group with others with the same health condition and experiences made the children's support group effective.

Mentors thought that children could talk to peers in the support group in a different way than their parents. They believed that the support program augmented support from families because mentors and peers provided advice and understanding based on personal experience.

Social Learning. They reported learning coping strategies for dealing with loneliness, making new friends, fears, or lack of control. Children thought "*it was cool*" to learn from peers' experiences. Many participants believed they learned new strategies to manage asthma and allergies from their peers or peer mentors. Children explained that learning what others did in similar situations, modeling, and role playing in the online support group helped them to understand that they could seek support from their peers and the public. Indeed they became more confident in seeking support.

Parents believed that the positive exchanges between the children and mentors helped children to form bonds with their peers and promote social cohesion. They said that talking with their peers and mentors who have similar problems gave their children new skills to handle difficult social situations.

In mentors' views, this support group helped children to deal with social challenges of asthma or allergies, such as confidently explaining their condition to others.

Social Comparison. The intervention enabled children to compare their problems with others facing similar challenges with allergies and asthma. In this intervention, children loved talking to "children like me." Children indicated they were more relaxed because there were other kids like them, which they found, "comforting" and "soothing." The group experience reinforced that there were other children in similar situations with comparable experiences. They believed that only others with similar experiences could understand their frustrations and problems.

Children described instances of both upward and downward social comparison in the online support group for improved reactions and response to asthma and allergies. Some children compared themselves to other children who had asthma and allergies which were difficult to control and said this made them more comfortable and confident. Two children with asthma thought peers with anaphylaxis were far worse off than them because they

always had to carry an EpiPen. Children with food allergies said they could avoid the allergen, but that those with asthma had more stressful situations because they had to take medication all the time. Most children enjoyed comparing themselves to peers in the program who were doing well. Many children were surprised that elite athletes had asthma and allergies and believed that they could pursue athletic goals.

Parents believed that their children were inspired to be like other children and their peer mentor. They thought comparison helped children to take their condition seriously yet not worry. They understood that comparison with others helped to normalize their children's lives.

Mentors used children's negative experiences to ask the group for better strategies to manage the situation. Participants learned that other children had more positive experiences and believed that if they emulated similar behavior, they would also be able to successfully manage their environments. As illustrated by the 13-year-old male mentor's comments, "One of the kids had worries about asthma and allergies and by comparing himself to others, he realized he was just the same as others." The mentors also credited comparison with helping the children to realize that it was normal to have differences; skills, hopes and wishes, strengths, and weaknesses.

What Were the Key Ingredients of the Intervention? (Research Question 3)

Children said they liked talking to the others in the group about their condition. Most reported that they met new friends (92%), were now part of a group, and felt more "like other children" and less alone (75%). Children, parents, and mentors believed that the online peer support group helped the children to realize they were not alone and that children enjoyed talking to peers about their experiences and coping strategies. Open communication with other children with asthma and allergies and mentors about feelings and experiences was a new experience for many participants. Talking to other children and mentors in the support group sessions helped to normalize asthma and allergies. They recognized that other children faced similar challenges and were able to cope.

The online delivery of the children's support intervention made the program accessible to children. Most children (77%) were able to access the support intervention independently. Children participated from the comfort of their own homes. They found GoToMeeting and Club Penguin easy to use and enjoyed talking to others using headphones and online chat. PowerPoints content was easily displayed, the children were able to interact using the

pointers and drawing tools, and children and mentors enjoyed the ability to share content from their computer. Some parents said their children liked the privacy and were independently involved with the online support group but others noted that their children required some help with computer technology and encouragement to engage in the conversation. Children were not dependent upon parents for transportation and parents did not have to find child care for siblings.

Children, parents, and mentors agreed that mentoring was a critical element in the support group. Children said that peer mentors ensured that they felt welcome, launched the meeting, and included all children. Peer mentors were role models.

Parents agreed that *"the mentors kept them focused rather than letting them drift"* (Mother of 10-year-old girl with anaphylaxis) and were impressed that their children valued mentors as credible sources of support and positive role models. One mother said she was impressed by the mentor's ability to interact with children.

Mentors noted they coached the group and were like older friends who could provide advice and support based on personal experience. They learned from the children and enjoyed mentoring because of the positive impacts.

What Factors Influence the Success of the Intervention? (Research Question 4)

Participation in the online peer support intervention was high with 86.3% on average over the 8 weeks of the intervention. Participation in individual sessions ranged from 16 participants in week 4 (during school break) to 26 of 27 children. High participation rates indicate that children were interested and engaged in this innovative online intervention. Children, parents, and mentors thought that the group format and small group interactions with other children with asthma and allergies were key to the success of the online support program. Mentors thought that all children were engaged, contributed, and felt important, *"everyone else feels like their ideas were really cool."* They believed that group size was important and preferred groups of six which offered time for members to share stories. Smaller groups created challenges for discussion but made it easier for quiet or shy children to contribute.

Most children liked meeting on the Internet. Several children preferred to meet on the Internet rather than face-to-face, *"The Internet was better because you're not looking at them straight in the eye. I guess it is a bit easier. I think I shared my feelings better. Face-to-face would be hard."* These children and the mentors thought the anonymity of the Internet allowed them

to share their problems and talk freely about feelings. A few children said they missed the facial and body language of face-to-face communication. Most parents liked online delivery as it accommodated family schedules and children could participate independently.

A few parents thought the online meeting sessions were good, but wanted an additional face-to-face meeting during the intervention. Some said that to help them bond, children could meet face-to-face before the online support group began, but others thought that an in-person meeting would be preferable after the children became acquainted virtually. A few parents believed that their children contributed to the group more comfortably, because they were not in the same room with their peers. Most parents and children appreciated the frequency and timing of the support group. Mentors commended the advantages of online delivery of support, but missed the nonverbal cues offered through body language.

Children, parents, and mentors also enjoyed the program because it was fun. Children developed friendships with their peers and played on Club Penguin. Club Penguin enabled children to develop relationships because they could talk on the headsets while playing games together.

Discussion

In this online social support group intervention, children with asthma and allergies received support together. By sharing their experiences, listening to peers' experiences, and role playing, the children were introduced to practical skills like problem solving, communicating, positive ways of educating others, seeking support, and advocating for themselves. This pilot online support intervention suggests that support from peers and peers mentors can reduce children's isolation, improve coping and support seeking, and enhance their self-confidence. Children have to cope with emotional and social aspects of chronic asthma and allergies without support from anyone other than their families (Akeson et al., 2007; Kastner et al., 2010; Smith et al., 2005; Yang et al., 2010). Given the episodic nature of asthma and allergies, communication of knowledge alone is not sufficient to encourage children to maintain medication adherence and avoid allergens (Boyd et al., 2010; Rhee et al., 2010; Smith et al., 2005). Indeed, asthma management guidelines recommend supportive environments (Boulet et al., 2008; GINA, 2007).

Online interventions are acknowledged as a viable means of supporting adults with chronic illness (Ewing et al., 2009; Sullivan, 2008; Valentis, 2005), but our research reveals that this is also an appropriate and relevant way of supporting children. The Internet has been used to provide information, education, and even monitoring for asthma and allergies (Bennett &

Glasgow, 2009; Boyd et al., 2010; Bravata et al., 2009). However, our study suggests that the Internet is an excellent medium for supporting and educating children. Although some websites have bulletin boards, real-time online conversation between children has not been reported in the literature (Bravata et al., 2009; Stinson et al., 2009). Mentors and participants believed that the ability to converse and share applications on computers in real time fostered formation of a supportive group. They contended that the anonymity of the Internet helped private and shy children to participate. This intervention was designed to promote peer-to-peer support.

The high participation rates indicate that children were actively engaged in the intervention. Unlike many web-based education programs (Cuijpers, van Straten, & Andersson, 2008; Han et al., 2010; Patel, 2005) this support program had high participation rates. Parents and mentors agreed that the instruction prior to the initial support group session helped enhance the accessibility of the intervention. Families of children with cancer who received training were more likely to use online programs (Ewing et al., 2009). In many Internet interventions, the focus is on technology design (Gustafson et al., 2008; Han et al., 2010), yet people want to make personal connections (Han et al., 2010). This support group was implemented with an inexpensive, generic online meeting interface. In summary, to these parents and children accessible, comprehensive, and reliable meant their Internet meeting space was convenient and safe, they could talk about a wide variety of topics relevant to their situation and learn from their peers, and a professional mentored the group.

Implications for Nursing Practice and Research

Nursing researchers have demonstrated that social support increases people's resources to cope with chronic conditions (Compaci, Ysebaert, Obéric, Derumeaux, Laurent, 2011; MacDonald & Greggans, 2010; Tarkka, Paavilainen, Lehti, & Åstedt-Kurki, 2003). Interventions do not address the psychosocial aspects of coping with asthma in daily lives (Yorke, Fleming, & Shulldham, 2007). Increasingly, nurses recognize that the Internet has changed the way children and their families seek health information and support (Kyngas, 2004; Sullivan, 2008). While adolescents with asthma want support from nurses and other health professionals and from their peers, interventions continue to focus on disease-based education and management (Kyngas, 2004; Penza-Clyve et al., 2004; Theofanidis, 2007). Nursing research indicates that adults with chronic conditions (Horgan & Sweeney, 2010; Sullivan, 2008; Valentis, 2005) and adolescents (Kyngas, 2004) may prefer the accessibility and anonymity of online approaches. However, little is known about factors that must be taken into account to enhance the success of online

support interventions (Eyesenbach et al., 2004; Protudjer et al., 2009; Protudjer, Kozyrskyj, & Becker, 2011; Stinson et al., 2009) or about how online support interventions can be designed to meet the unique needs of children. Little is known about the processes, conditions, and factors influencing the impact of these interventions (Gottlieb & Bergen, 2010). Intervention participants are rarely invited to share perceptions of interventions and intervention processes are typically not documented. The study bridges gaps in previous research by: (a) designing the online support intervention based on perceived needs and intervention preferences of children with asthma and allergies, (b) using peers and professionals working in partnership as support providers, and (c) focusing holistically on children's lives rather than the chronic condition only.

The peer mentors and program content targeted to the unique needs and interests of these children with asthma and allergies encouraged and sustained participation. The content for the group sessions was initially designed based on assessment from child and parent perspectives, and then individual weekly sessions were subsequently adapted to the unique and changing needs of each group. The content of this online support intervention for children with asthma and allergies could be modified and adapted for children with varied chronic conditions. Unlike many online groups for adults with chronic condition reported in the literature (Cuijpers et al., 2008; Eyesenbach et al., 2004; Stinson et al., 2009), this intervention included both health professionals and trained peer mentors. Peer mentors reported that their training by researchers and the support they received from health professional partners were critical factors in ultimately meeting the support needs of the children. Peer-professional partnerships in support and education programs reduce differences in status and invite participation (Boothroyd & Fisher, 2010; Stewart, 2000). As Internet is available in many remote and rural settings (Murray et al., 2006; Nicholas et al., 2009) it is a useful tool for community-based nursing interventions regardless of location. The low cost and adaptability of this online support intervention can be modified and replicated by nurses in diverse settings for children representing different ages and chronic conditions and tested through larger scale intervention trials.

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