

Pilot Testing *Okay With Asthma*[™]: An Online Asthma Intervention for School-Age Children

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ABSTRACT: Asthma is the leading cause of missed school days despite advancements in asthma treatment. This may be, in part, due to a lack of understanding about asthma. *Okay With Asthma*[™], an online story with psychosocial management strategies for school-age children, was pilot tested to measure its effect on asthma knowledge and attitude. The online program delivers content about asthma through a digital story and story-writing program. Using a one-group pretest-posttest quasi-experimental design, 35 children with moderate to severe asthma completed a pretest measure of asthma knowledge and attitudes and then completed *Okay With Asthma*[™]. At 1 week and 2 weeks after the intervention, the children completed the measures again. There were significant improvements in asthma knowledge scores at the 1- and 2-week evaluations and significant improvements in attitude scores 2 weeks after the program. *Okay With Asthma*[™] specifically targets school-age children and teaches them how to use school resources and peers while managing their asthma.

KEY WORDS: asthma, digital story, psychosocial management, storytelling, story writing

INTRODUCTION

Asthma, an obstructive airway disease characterized by recurrent episodes of breathlessness and wheezing, is one of the most prevalent chronic illnesses among children in the United States. Approximately 13% of American children between 0 and 17 years of age have been diagnosed with asthma during their lifetime, and 9% currently have asthma (Federal Interagency Forum on Child and Family Statistics, 2007). Low-income and African American children have incidence rates almost two times that for children of other races and backgrounds. Although the incidence of asthma rose rapidly during the early 1990s, the rate increases have stabilized since 1997. Although the stable prevalence rates are encouraging and in part attributable to im-

proved asthma medications and intervention programs, a large number of children continue to be affected by this disorder.

Asthma is the leading cause of missed school days and the third leading cause of hospitalizations in children (U.S. Environmental Protection Agency, Indoor Environments Division, 2007). Asthma requires ongoing management. Because children spend approximately half of their weekday waking hours in school, the school nurse often participates in the management of their asthma.

Okay With Asthma[™], developed for school nurses to use in health offices, encourages children to become active participants in their own asthma management. It is an online asthma management program for children 8 to 11 years of age. The program is unique because it incorporates the traditional content of asthma management along with psychosocial strategies for managing asthma. The program uses a unique interactive and media-rich method, digital story, and story writing to deliver the curriculum. Because the program is published on the Internet, it is free and accessible to any school with Internet access. The self-guid-

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ed program can be completed independently by a child visiting the health office without dedicated instructional time by the school nurse. Once the program was developed, it was pilot tested to measure the effect of the *Okay With Asthma*[™] program on asthma knowledge and attitudes about having asthma in school-age children.

BACKGROUND

Although the exact cause of asthma is unknown, factors known to trigger episodes include infections, allergic reactions, exercise, and stress. Approximately 75% to 80% of children with asthma have allergies (Kemp & Kemp, 2001). Because children spend a significant amount of their weekdays in schools, they are susceptible to asthma attacks during school. Children with asthma may experience psychosocial stress, leading to negative attitudes about asthma and low self-esteem, which affects school performance, family and peer relationships, and asthma management (Wood & Miller, 2002). Therefore, it is important to integrate psychosocial management strategies into asthma education programs.

Many programs for children with asthma are based on the guidelines of the National Asthma Education and Prevention Program (NAEPP) developed by an expert panel representing the National Heart, Lung and Blood Institute (NHLBI; 2007), but they do not necessarily address the emotional component of children's experience with asthma. Recent programs recognize this shortcoming and include strategies for coping with asthma. For example, *Quest for the Code*[™] by Starbright[®], an interactive CD-ROM game for children, describes how to talk with peers about asthma as well as provides information about the medical management of asthma.

Asthma education programs for children are traditionally based on a family model and focus on the family's role in managing the child's asthma. Although family involvement is essential, a child involved in his or her own care will assume more responsibility and ultimately feel more in control, promoting a more positive attitude about having asthma (Wood & Miller, 2002). Children in school or engaged in after-school activities must identify their own symptoms during an asthma attack and seek help outside the family, relying on school, peer, and community interactions to assist with self-management.

Some asthma programs for school-age children are designed for classroom settings, such as *Open Airways for Schools*[®] (American Lung Association, 1997), *Kick-in' Asthma* (American Public Health Association, 2006), and *Asthma Awareness: Curriculum for the Elementary Classroom*[™] (NHLBI, 1993), whereas others are designed to be fully integrated in the community, such as the *Asthma-Friendly Schools Initiative* (American Lung Association, 2007). Because of increasing

curricular demands, such labor and time-intensive programs are difficult to implement, often not integrated into the curriculum, and may be taught by persons who do not have sufficient knowledge or experience with the management of asthma.

Other asthma programs use multimedia, which is effective in increasing health-promoting behavior (Huss, Winkelstein, Crosbie, Stanton, & Huss, 2001). Children typically become more involved in multimedia activities than traditional educational activities because they have grown accustomed to learning in audiovisual environments (Mayer, 2001). One useful role-modeling strategy for school-age children is story. *Okay With Asthma*[™], the intervention tested and reported in this study, uses story and story-writing techniques to teach children about asthma and ways to cope with having asthma.

Story is the communication of information through a storyline with characters, conflict, and resolution of the conflict. There are two components of story: storytelling (receiving a story) and story writing (making a story). Information that is presented in a story format may be more effective in improving knowledge and changing behavior because knowledge and information are processed and stored in one's memory as a story (Egan, 1997). *Okay With Asthma*[™] aims to fill the gap in asthma programs for school-age children by including traditional asthma management content as well as psychosocial management strategies in a multimedia innovative technique using digital story. The psychosocial management strategies are based on the biobehavioral family model (Wood & Miller, 2002) that engages not just the family in asthma management but also peers, the health care system, and the community such as schools. It is believed that children who engage their friends in asthma management are less likely to hide their condition from peers. Furthermore, peers are less likely to tease children with asthma if they share the responsibility of identifying symptoms or getting assistance during an asthma episode.

METHODS

This study used a one-group pretest-posttest quasi-experimental design to pilot test the effectiveness of *Okay With Asthma*[™] in increasing asthma knowledge and improving children's attitudes toward their illness. A child's knowledge and attitude about asthma were measured at baseline and 1 and 2 weeks after completing *Okay With Asthma*[™]. Once the study was approved by the Institutional Review Board, 169 letters requesting participation in this study were sent to families of children with asthma who were between the ages of 8 and 11 years and enrolled in 1 of 16 participating rural public elementary schools. Fifty-three families returned a self-addressed postcard indicating interest in the study. Sixteen children were ex-

cluded from the study because they did not meet inclusion criteria, which were (a) ability to complete assent forms; (b) children without cognitive, psychiatric, or behavioral disturbances identified by the school nurse; and (c) children with moderate to severe asthma based on the NAEP-recommended rating scale. Thirty-seven children enrolled in the study, completing pretests and visiting the *Okay With Asthma*[™] program. Thirty-five children completed all measures; 2 withdrew from the study after the first measure because of scheduling conflicts.

Instruments

The Asthma Information Quiz (AIQ) measured asthma knowledge (Wade et al., 1997). This is a 23-item true-false questionnaire testing a child's knowledge of asthma triggers, symptoms, medication management, and prevention. This measure was modified by simplifying the language to reflect a Flesch-Kincaid Grade Level Score of 3.0, changing double-negative language in the items and adding four items pertaining to the psychosocial management of asthma. The AIQ is scored by calculating the percentage of items answered correctly.

The Child Attitude Toward Illness Scale (CATIS) was used to measure the participants' attitudes toward having asthma. This 13-item, 5-point Likert-type scale instrument is a self-report scale developed for children aged 8 to 12 years. The CATIS is scored by summing the numerical responses and dividing by 13. High scores reflect positive attitudes (Austin & Huberty, 1993). The alpha reliability coefficient for this scale was .91, with an interitem correlation ranging from .04 to .71 with a mean of .44.

Procedures

Upon receipt of the postcard from parents indicating interest in the study, the investigator met with each child and his or her caregiver(s) to obtain parental consent and child assent and to collect descriptive data. Descriptive data were obtained to identify factors that might influence the results. These included the child's learning preferences, access to a computer, family structure, current asthma care, and demographics such as gender, age, race, and number of years diagnosed with asthma.

This study took place during school or after school hours in computer labs of public elementary schools. Data were collected over a 10-week period during the spring season; all children in the study reported asthma symptoms during the course of the study. None of the children participated in other asthma intervention programs during the study. At the participating schools, children completed pretests, the *Okay With Asthma*[™] program, and posttests. Because of existing public school curriculum requirements, children in

this study had the basic computer skills necessary to participate in the *Okay With Asthma*[™] program.

During the first session, children completed the pretests and *Okay With Asthma*[™] program under the supervision of the investigator. The investigator conducted a debriefing with each child after viewing the multimedia program, asking questions such as, "Is there anything that you saw in the story that upsets you or makes you feel bad?" One week and 2 weeks after completing the program, children completed the posttests under the supervision of the investigator. The participating children received a \$10 certificate after completing the posttests at the 2-week interval. The two participants who withdrew from the study received their \$10 gift certificate by mail.

Data Analyses

To determine if *Okay With Asthma*[™] improved knowledge scores on the AIQ and attitude scores on the CATIS, scores were calculated and analyzed using *t* tests and Wilcoxon signed rank tests, pairing pretests with 1-week scores and pretests with 2-week scores. The alpha for significance was set at $p < .05$. Descriptive data collected during the interviews were analyzed using descriptive statistics. Data from the two children who withdrew were not included in the analyses.

RESULTS

The number of boys and girls who participated in the study was nearly equal. The convenience sample yielded an ethnic representation equal to that of the geographic region in a rural community in central Virginia where the study took place. Demographic data are listed in Table 1. Only 4 (11%) of the 35 participants received care from an asthma specialist; the remaining children received care from either a pediatrician or a family practice physician. Two children (6%) had previously participated in an asthma education program.

In measuring the effects of the *Okay With Asthma*[™] program on knowledge and attitude 1 week after completing the program, a significant difference was found between the knowledge pretest and 1-week posttest scores ($t = 3.107, p = .004$) but not between attitude pretest and 1-week posttest scores ($t = 1.636, p = .111$). Two weeks after completing the program, both knowledge and attitude scores were significantly improved. Children scored higher on 2-week posttest knowledge scores ($z = 2.705, p = .007$) and attitude scores ($z = 2.554, p = .011$).

Overall, the attitude scores improved at either 1 week posttest or 2 week posttest in 31 of 35 participants (highest possible score = 5). The knowledge scores improved at either 1-week posttest or 2-week posttest when compared to pretest in 30 of 35 participants (highest possible score = 35). See Figures 1 and

Table 1. Demographics of Study Participants ($n = 35$)

Characteristic	n (%)
Gender	
Male	19 (54)
Female	16 (46)
Age (years)	
8	15 (43)
9	7 (20)
10	9 (26)
11	4 (11)
Race	
American Indian or Alaskan	0 (0)
Asian or Pacific Islander	1 (3)
Black, not Hispanic origin	12 (34)
Hispanic	2 (6)
White, not Hispanic origin	20 (57)
Asthma severity	
Moderate	25 (71)
Severe	10 (29)
Activity limitations	
Minimal	18 (52)
Moderate	12 (34)
Severe	5 (14)
Asthma duration	
Less than 1 year	5 (14)
1-3 years	10 (29)
3-5 years	20 (57)
Family history of asthma	
Asthma history	24 (69)
No asthma history	11 (31)
Learning styles	
Auditory	12 (34)
Visual	10 (29)
Kinesthetic	13 (37)

Child Attitude Toward Having Illness Scores (Attitude)

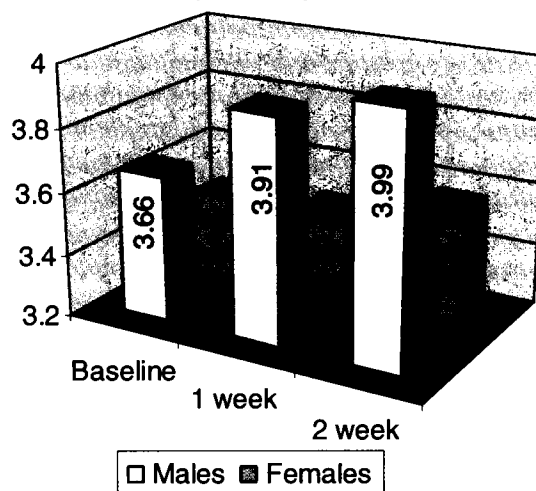


Figure 2. Comparison of Male and Female Attitude Toward Asthma Scores ($n = 35$)

2 for mean scores and differences between boys and girls during each evaluation. Ten-year-old participants scored significantly higher on knowledge pretest scores than the 8-, 9-, and 11-year-old children ($t = -2.351, p = .025$).

Overall, the mean attitude scores of both boys and girls improved at each evaluation (highest possible score = 5), but boys scored consistently higher on the attitude measure than girls did (Figure 2). Participants with severe asthma had a significantly greater change in attitude scores from pretest to 1-week posttest compared with children with moderate asthma ($t = 2.13, p = .041$). Lastly, novice Internet and computer users, as rated by parents, had significantly greater increases in attitude scores between pretest and 2-week posttest scores than proficient Internet users ($t = 2.74, p = .010$) and proficient or advanced computer users ($t = 2.41, p = .021$).

Asthma Information Quiz Scores (Knowledge)

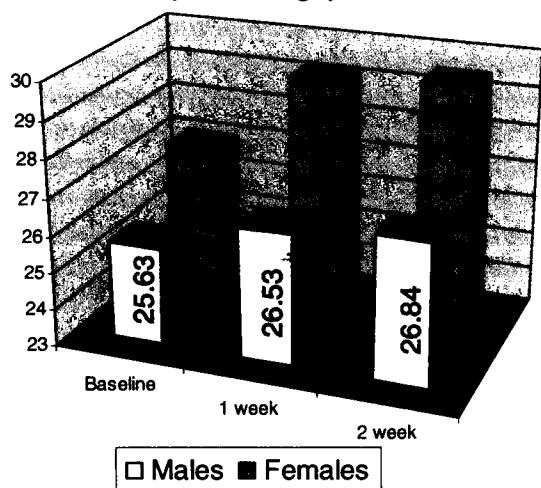


Figure 1. Comparison of Male and Female Asthma Knowledge Scores ($n = 35$)

DISCUSSION

Okay With Asthma[™] used digital story to deliver asthma management strategies, including psychosocial strategies to adjust to asthma as well as the role of school personnel and peers in helping a child adjust to asthma. The program reinforced family, peer, and school involvement in managing asthma by role-modeling effective strategies such as eliciting help from others and talking with friends about feelings associated with asthma.

Attitude, which is widely documented as difficult to change, was significantly improved in as little as 2 weeks. The greatest change in attitude scores occurred in children with severe asthma, because of their lower attitude baseline scores, and children 8 years of age, possibly because of their enthusiastic interest in the program. Children with fewer computer and Internet

skills, as rated by their parents, scored better on attitude measures than did children with more computer skills, indicating that *Okay With Asthma*[™] is useful regardless of computer skills and, in fact, may be suitable for younger children with fewer computer skills.

There are limitations to this study. The knowledge tool was challenging for some participants. It was selected because it had been used in previous pediatric asthma studies (Wade et al., 1997). In some cases, it was necessary for the investigator to read items aloud and explain questions or concepts so the child could respond to the item. Despite these shortcomings, knowledge scores improved and were sustained for 2 weeks.

More research is needed to determine the efficacy of *Okay With Asthma*[™] and the retention of changes in knowledge and attitude using larger samples of children with asthma. Furthermore, to generalize these findings and determine the program's efficacy, the intervention must be tested with larger samples of children and over a longer period of time to determine the retention of asthma knowledge and attitude toward having asthma.

IMPLICATIONS FOR SCHOOL NURSING PRACTICE

School nurses consistently report spending more of their school days providing care to children with asthma. In a survey conducted in one public county school, school staff reported not only providing more immediate care during asthma episodes but also administering asthma maintenance medications that in the past were administered at a child's home (Knox County Public School Report, 2007). This increased responsibility of school staff is time intensive and leaves less time and resources to teach children about health and wellness and how to manage their conditions. *Okay With Asthma*[™] helps deal with time restrictions of school staff because the program is self-guided, requiring little to no school staff guidance. The program, which is available at www.okay-with-asthma.org, includes a 20-minute animated story about a school-age girl with asthma. While playing outside with her friends during recess, she pets a stray dog. This initiates an asthma attack that requires medication. She visits the health office, where she learns about her triggers, an action plan, and how important it is to include peers and school staff in her asthma care. At the end of the story, users may write their own story by adding text to a prewritten story. The asthma content is presented in an interactive and animated movie-style story that is entertaining while teaching children ways to manage their asthma and the importance of including friends and peers in asthma care.

The program is designed for school-age children with asthma but also can be used to teach children who do not have asthma. This is an important aspect

of effective programs because children who are supported by their peers are less likely to hide their condition. Because *Okay With Asthma*[™] is a self-guided program, school staff may encourage children to preview the program while waiting for their asthma medication to relieve their symptoms. It may also be used in a lesson plan to introduce asthma, asthma triggers, and treatment. The program may also serve as a resource for children who must learn about various chronic disorders in the health curriculum.

CONCLUSION

Okay With Asthma[™] has promise for children with asthma. The use of stories as an instructional method has long been used in education, and the use of interactive technologies in health education is emerging. Prior interventions have not incorporated story and psychosocial asthma management strategies using interactive technologies in a self-guided Internet-based program. The testing of *Okay With Asthma*[™] provides information about an innovative computer-based program using novel health education strategies. It contributes to knowledge in health care research by suggesting innovations that have promise in promoting health in children with chronic illnesses.

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