

## BRIEF ARTICLE

**Sun Protection Awareness Through Reading in Kids (SPARK): A Pilot Study in Pediatric Dermatology Clinic**

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**ABSTRACT**

This pilot study aimed to create and evaluate a scientifically accurate children's book about sun protection and assess its impact on caregiver knowledge and satisfaction. Twenty caregivers completed pre- and post-intervention surveys, revealing significant improvement in sun safety knowledge ( $p=0.0312$ ) and identifying common barriers such as "My child doesn't like wearing sunscreen" and "Staying in the shade is hard." Caregivers unanimously agreed that the book effectively delivered relevant safety information to children and offered valuable insights for fostering sun protective behaviors. These findings suggest the utility of educational children's literature as a promising tool for improving sun safety practices and identifying caregiver barriers.

**INTRODUCTION**

In 2025, over five million new cases of keratinocyte skin cancer and 100,000 cases of melanoma will be diagnosed in the United States.<sup>1</sup> Despite its growing prevalence, skin cancer risk is modifiable through behavior changes that reduce ultraviolet (UV) light exposure. Notably, 40-50% of lifetime UV exposure occurs before age 20, yet sun protection among youth remains inadequate.<sup>2</sup> Over half (57.2%) of American high school students report at least one sunburn annually and fewer than half of parents routinely use sun protection for their children.<sup>3,4</sup> These trends highlight the importance of early educational interventions, as children can understand sun protection concepts and form enduring habits.<sup>5,6</sup>

Children's books provide an engaging medium for educating families about sun safety. By integrating evidence-based practices and relatable illustrations, books can effectively communicate health messages.<sup>7,8</sup> Previous studies have demonstrated their utility in teaching health behaviors, including managing atopic dermatitis.<sup>9</sup> However, gaps remain in educational tools targeting sun safety for elementary-age children, particularly for non-white populations, who report less sunscreen use, less skin cancer knowledge, and lack awareness of their risk.<sup>10</sup> This project addresses this gap by developing and evaluating *Sage's Sun-Safe Adventure*, a children's book designed to teach sun protection strategies.

**METHODS**

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This study utilized a cross-sectional pre/post-intervention design with a qualitative component to evaluate *Sage's Sun-Safe Adventure*, created by a medical student (GR) and reviewed by board-certified pediatric dermatologists (NS, JF). Participants included English-speaking parents or guardians of children aged 4-10 attending a dermatology clinic in New York City. Institutional Review Board approval and informed consent were obtained.

*Sage's Sun-Safe Adventure* follows a young girl learning about sun safety from characters like Sun, Cloud, and Snow. The story introduces practices including wearing sunscreen, hats, sunglasses, and rash guards and seeking shade. It emphasizes the importance of sun protection and features a diverse range of skin tones.

Data collection included three phases. A pre-survey collected demographic data, perceived barriers to sun safety, and baseline knowledge via a multiple-choice quiz ([Supplement 1](#)). Next, participants read *Sage's Sun-Safe Adventure*, which features colorful illustrations, rhymes, and bonus notes for caregivers ([Supplement 2](#)). Some caregivers read the book aloud to their children, while others read it independently. A post-survey reassessed knowledge using the same quiz and gathered feedback on content, design, and relevance.

The primary outcome was the change in sun safety knowledge, measured by pre- and post-survey quiz scores. Statistical analysis utilized Wilcoxon signed-rank tests in GraphPad Prism and racial barrier comparisons using the CBCgrps package in R. Descriptive statistics summarized barriers and caregiver preferences, while qualitative feedback was analyzed thematically.

## RESULTS

Twenty caregivers participated in our survey, and there was a 100% response rate (**Table 1**). Most were white (63.2%), non-Hispanic (73.7%), privately insured (85%) and had household incomes over \$250,000. Caregivers rated their opinions on sun-protective items on a scale from 1 ("Child never uses") to 5 ("I love using this"). Caregivers expressed generally positive opinions toward all sun protection items. Most participants responded with scores of 5 for sunscreen (65%), hats (70%), and rash guards (80%).

While 40% of participants reported no significant barriers to sun safety, others cited challenges such as children disliking sunscreen (20%) and difficulties staying in the shade (25%). No significant racial differences in the use of sun protection items or barriers were found ( $p>0.05$ ). However, more non-white participants reported that there are no barriers to keeping their child sun-safe (71% vs. 25%,  $p=0.07$ ), indicating a potential trend.

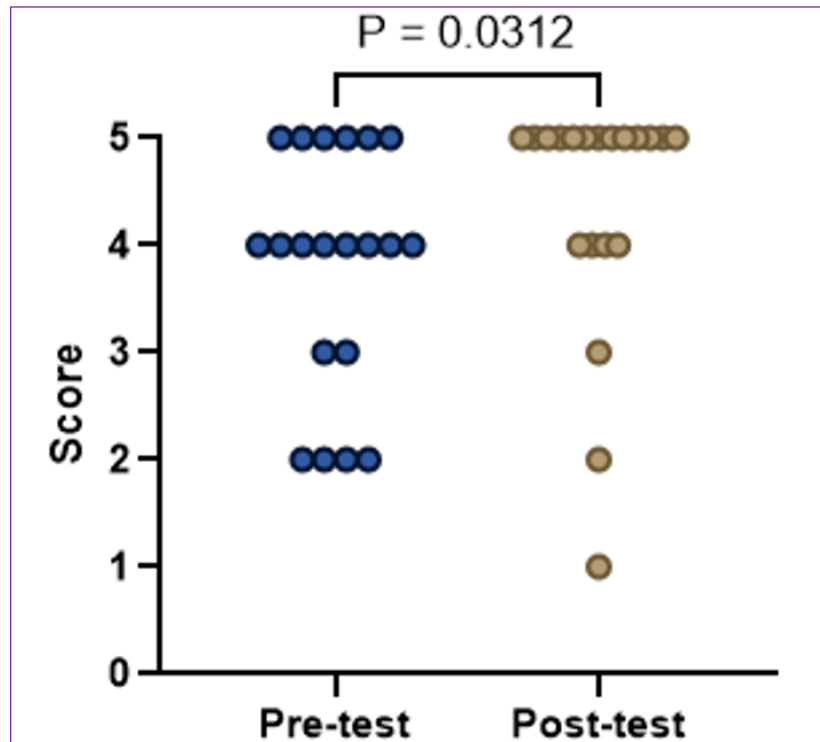
To assess the book's effectiveness, participants completed a five-question multiple-choice quiz before and after reading, covering topics including peak UV exposure times, sunscreen reapplication, SPF recommendations, sun-protective clothing, and tanning bed risks. Post-survey quiz scores improved significantly, with mean scores increasing from 3.8 to 4.4 out of 5 ( $p=0.0312$ ), indicating improved sun safety knowledge after reading the book (**Figure 1**).

Open-ended responses highlighted the book's engaging and educational content, praising its visuals and accessibility. Suggestions for improvement included increasing diversity, simplifying text, and

**Table 1.** Participant Demographics

Characteristic	Number of Participants, n (%)
Caregiver Role	
Mother	11 (55%)
Father	8 (40%)
Other	1 (5%)
Adult and Child Race*	
White	12 (63.2%)
Black or African American	2 (10.5%)
Asian	1 (5.3%)
Middle Eastern or North African	1 (5.3%)
Other	2 (10.5%)
Prefer to not answer	1 (5.3%)
Adult Ethnicity	
Not Hispanic or Latino	14 (73.7%)
Hispanic or Latino	5 (26.3%)
Child Ethnicity	
Not Hispanic or Latino	12 (70.6%)
Hispanic or Latino	5 (29.4%)
Annual Household Income	
< \$25,000	1 (5.6%)
\$100,000-149,000	3 (16.7%)
\$150,000-249,999	1 (5.6%)
>\$250,000	10 (55.6%)
Prefer not to answer	3 (16.7%)
Caregiver Education	
High school graduate	1 (5%)
College graduate	7 (35%)
Graduate degree	12 (60%)
Insurance Type	
Private	17 (85%)
Public	1 (5%)
Uninsured	1 (5%)
Prefer not to answer	1 (5%)

\*Same breakdown for adults and children. Note: Not all participants answered all questions.



**Figure 1.** Knowledge quiz scores before and after intervention. Participants completed a five-question quiz as a baseline measurement. The same quiz was readministered after reading the book. Pre- and post-test scores were compared using the Wilcoxon matched pairs signed rank test (n=20 individuals).

adding interactive elements. Several participants highlighted the importance of addressing misconceptions about sunscreen use among darker-skinned individuals.

## CONCLUSION

This study highlights caregivers' positive attitudes toward sun protection and the effectiveness of *Sage's Sun-Safe Adventure* in enhancing sun safety knowledge. The study's small sample size and single-center design including mostly privately insured patients limit generalizability, but findings underscore the potential of targeted educational interventions. Future studies should explore long-term impacts, adapt materials for diverse cultural contexts, and expand research to broader populations. Next steps include translating the book into additional languages and conducting larger-

scale studies to ensure inclusivity and efficacy.

**Conflict of Interest Disclosures:** NG is an employee of Mount Sinai and has served as a consultant for Almirall, Daiichi Sankyo, and Primus Pharmaceuticals. Other authors have no conflicts of interest to declare.

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