

Characteristics and Effectiveness of Targeted Melanoma Prevention Interventions for First-Degree Relatives of Melanoma Survivors: An Integrative Review

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Abstract

First-degree relatives of melanoma survivors have at least a twofold increased risk for developing melanoma, but studies show that they do not regularly adopt sun safety behaviors. While there is no definitive method to prevent skin cancer, there are ways to dramatically reduce the risk. Determining which interventions positively impact the adoption of prevention behaviors will assist in the development of strategies to reduce the occurrence of melanoma in first-degree relatives. A literature search was conducted using PubMed and Scopus in December 2024. The search focused on studies related to first-degree relatives of melanoma survivors and included discussion of prevention interventions. Five articles were included in this integrative review. Overall, the studies found that targeted prevention interventions led to improvements in sun protective and screening behaviors in first-degree relatives. However, the effectiveness of these interventions differed, which may have depended on how the interventions were delivered to the target audience and barriers to the adoption of sun protective behaviors. Variation in educational content did not appear to impact results. However, interactive educational content delivered online that involved the entire family was the optimal intervention to foster the adoption of sun safety behaviors in first-degree relatives. This review specifically focused on first-degree relatives of melanoma survivors. However, targeted prevention interventions can be applied to other cancers, due to family history of cancer as a risk factor and the fact that family members tend to share health habits.

Melanoma remains among the top five common cancers in the United States for both males and females (National Cancer Institute, n.d.). Cutaneous melanoma is a skin cancer that begins in melanocytes, the cells that give skin its unique color. While cutaneous melanoma is less common than other skin cancers, such as basal cell and squamous cell carcinoma, it remains the most lethal due to its ability to metastasize (American Cancer Society, 2023b). Over the past decade, melanoma death rates have declined due to treatment advances; however, the number of new cases has tripled over the past 30 years. About one in every 50 individuals will be diagnosed with melanoma at some point in their life (Melanoma Research Alliance, n.d.). The American Cancer Society (2026) estimates 112,000 new cases and 8,510 deaths from cutaneous melanoma in 2026.

As with any medical diagnosis, cutaneous melanoma has modifiable (e.g., environmental factors such as excessive ultraviolet radiation exposure or sun safety behaviors) and nonmodifiable risk factors (e.g., family history of melanoma or skin type; American Cancer Society, 2023a; National Cancer Institute, 2023; Zocchi et al., 2021). First-degree relatives, defined as immediate family members (parents, siblings, and/or children), are at least at a twofold increased risk for developing melanoma (American Cancer Society, 2023a; Zocchi et al., 2021). While there is no definitive method to prevent skin cancer, there are ways to dramatically reduce the risk, including sun safety behaviors and regular skin exams (American Cancer Society, 2023b; Melanoma Research Alliance, n.d.).

In the 1980s, the Australian Government launched the *Slip, Slop, Slap!* campaign, one of the most successful health initiatives in their history (Cancer Council, n.d.). The campaign focused on promoting sun protective behaviors through five *SunSmart* steps: “1) *slip* on sun protective clothing; 2) *slop* on SPF50 (or higher) broad-spectrum, water-resistant sunscreen; 3) *slap* on a broad-brimmed hat; 4) *seek* shade; and 5) *slide* on some sunglasses.” The *SunSmart* steps have been adopted as sun protective behaviors in the United States by the American Cancer Society and the

Centers for Disease Control and Prevention. However, there are no Healthy People 2030 objectives aimed at sun protective behaviors (National Cancer Institute, 2025; Office of Disease Prevention and Health Promotion, n.d.).

Even with well-documented skin cancer prevention strategies, studies have reported that first-degree relatives of melanoma survivors do not regularly adopt sun safety behaviors or have regular skin exams (Bowen et al., 2012; Glenn et al., 2015). Determining which interventions positively impact the adoption of prevention behaviors will assist in the development of strategies to reduce the occurrence of cutaneous melanoma in this high-risk group. This review will characterize and report on the effectiveness of targeted melanoma prevention interventions for first-degree relatives of melanoma survivors.

METHODS

A search was conducted using PubMed and Scopus using the following keywords to identify articles for review: sunburn, sun protection factor, sun screening agents, sun-protect, melanoma, skin neoplasms, melanoma survivor, and melanoma survivor child or relative. Inclusion criteria specified original research publications, participants who are first-degree relatives of melanoma patients and/or survivors, and discussion of melanoma prevention interventions. Studies were excluded if they were conducted outside of the United States, not in the English language, published prior to 2010, and if sole participants were melanoma patients or survivors. A total of 450 records were retrieved. After removing duplicates ($n = 42$), 408 articles were selected for title and abstract screening, resulting in additional exclusions ($n = 393$) applying the exclusion criteria. Full-text screening was completed on 15 articles, with 10 excluded based on population ineligibility ($n = 7$), study performed outside of the United States ($n = 2$), and articles published prior to 2010 ($n = 1$). Five articles met the final inclusion criteria and were selected for analysis (Figure 1).

RESULTS

The five articles included three randomized controlled trials (Bowen et al., 2019; Gritz et al., 2013; Manne et al., 2010), a pilot study (Wu et al., 2018),

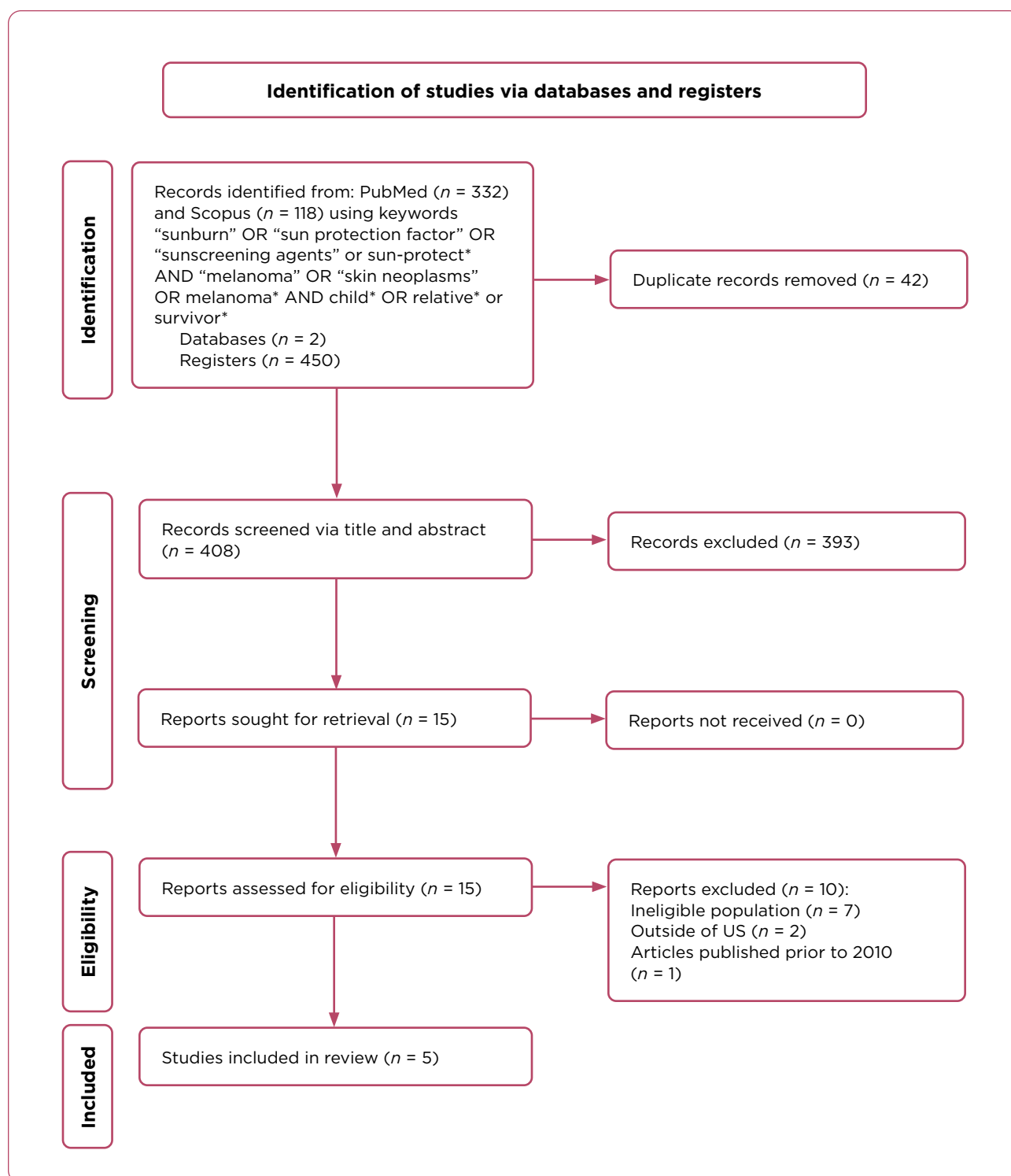


Figure 1. PRISMA flow diagram. Adapted from Moher et al. (2009).

and a correlational study (Tripp et al., 2016). The results from the studies are organized into three major categories: the target audience, intervention, and outcomes. The characteristics and findings of the studies are outlined in Table 1.

Target Audience

All five articles focused on first-degree relatives of melanoma survivors as the target audience, although varied in the specific first-degree relative (Bowen et al., 2019; Gritz et al., 2013; Manne et al., 2010; Tripp et al., 2016; Wu et al., 2018). First-degree relatives are defined as a parent, sibling, or child of the melanoma survivor. Bowen et al. (2019) and Wu et al. (2018) described their target audience as “family” units, which included a first-degree relative of a melanoma survivor. The study by Bowen et al. (2019) defined “family” as a melanoma case, one first-degree relative, and a parent (an adult family member who is a parent of a child 0 to 17 years), and included 311 families. The intervention was delivered to the family. The intervention in the study by Wu et al. (2018) was delivered to both the melanoma survivors and children. The study by Gritz et al. (2013) defined their target audience as melanoma survivors with children (aged ≤ 12 years) and included 340 participants. The intervention was delivered to both the melanoma survivor and the children. The article by Tripp et al. (2016) is a secondary analysis of the Gritz et al. (2013) study, utilizing data from the same target audience. Manne et al. (2010) defined their target audience as first-degree relatives (parents, siblings, or children at least 20 years old) and included 443 participants.

Intervention

All five articles included in this review described the intervention delivery method and the intervention content (Bowen et al., 2019; Gritz et al., 2013; Manne et al., 2010; Tripp et al., 2016; Wu et al., 2018). Interventions were aimed at improving sun protective and screening behaviors (e.g., applying sunscreen, wearing sunglasses, wearing a hat [preferably wide-brimmed], wearing protective clothing [long-sleeve shirt and pants], seeking shade, limiting time outdoors/avoiding the sun during peak hours, and skin exams).

Intervention Delivery Method

The three randomized controlled trials (Bowen et al., 2019; Gritz et al., 2013; Manne et al., 2010) and the pilot study (Wu et al., 2018) used a form of mass communication through different media for the intervention. The study by Bowen et al. (2019), a randomized controlled trial, used an interactive web-based behavioral intervention approach, the *Suntalk* website. The participants in the intervention arm were given access to the website during the study, whereas the participants in the control arm were given delayed access. Gritz et al. (2013) used multimedia in the form of three print booklets, a children’s activity booklet, and a 10-minute DVD for the participants in the intervention arm. The study also included a magnet to hang on the refrigerator as a “cue to action” for sun safety. The participants in the control arm received standard education in the form of three brochures. All multimedia was disseminated to participants through regular mail over a 5-month period. Manne et al. (2010) used mixed media, in the form of three printed mailings, sent monthly through regular mail. The participants in the intervention arm received tailored mailings, and the participants in the control arm received generic mailings. Manne et al. (2010) also included a telephone counseling session, both tailored and generic for the respective participants. The pilot study by Wu et al. (2018) also used multimedia, in the form of PowerPoint presentations and short videos, but held an in-person behavioral education session lasting approximately 30 minutes.

Intervention Content

In the three randomized controlled trials (Bowen et al., 2019; Gritz et al., 2013; Manne et al., 2010) and the pilot study (Wu et al., 2018), intervention content focused on targeted melanoma prevention. Gritz et al. (2013) and Manne et al. (2010) both had targeted content for the participants in the intervention arm and standard content for the participants in the control arm. Gritz et al. (2013) featured melanoma survivors in their targeted content for parents and their at-risk children to model the practice of sun protection through observational learning. The targeted content included risk perceptions, benefits, and the barriers of sun protection in children with personal stories

Table 1. Evidence Summary

Study, design, and objective	Sample size	Interventions	Outcome measure(s)	Results	Limitations
Bowen et al. (2019) Randomized controlled trial to test the effects of a family-based, web-delivered intervention.	<i>N</i> = 311 families (melanoma case, FDR, parent) Families randomized between intervention and delayed intervention (control) groups	Intervention delivery method and content: interactive web-based (<i>SunTalk</i> website); focused on melanoma risk reduction behaviors	Risk reduction behaviors of FDRs of melanoma survivors Sun protective behaviors: sunscreen, wide-brimmed hat, protective clothing, sunglasses, shade, avoiding midday sun Screening behaviors: skin self-exams, provider exams	Sun protective behaviors: significantly increased in intervention FDRs but not control group, particularly with wearing a hat ($p = .005$), seeking shade ($p = .008$), and avoiding midday sun ($p = .010$) Screening behaviors: significantly increased in intervention FDRs for self-exams ($p = .006$) and provider exams ($p = .005$) but decreased in control arm	Regional location (Pacific Northwest) Study limited to participants with internet access
Gritz et al. (2013) Randomized controlled trial to compare targeted melanoma sun protective education and standard education.	<i>N</i> = 340 Melanoma survivors with children (aged ≤ 12 years)	Intervention delivery method and content: disseminated through regular mail; targeted education via multimedia featured melanoma survivors and focused on sun protective behaviors; standard education included general information on sun protection	Child sunburn (past 6 months) Child sun protection of melanoma survivors: sunscreen, wide-brimmed hat, protective clothing, shade, avoiding midday sun	Child sunburn: rate did not decrease Sun protective behaviors: modest improvements with sunscreen reapplication ($p = .002$) and wearing a hat ($p = .045$)	Regional location (Texas and southern states) and seasonal variation Delivery method (regular mail)
Manne et al. (2010) Randomized controlled trial to compare tailored melanoma sun protective intervention and generic melanoma intervention.	<i>N</i> = 443 FDRs of melanoma survivors	Intervention delivery method and content: 3 monthly print mailings and telephone counseling session; tailored content had personalized skin cancer risk profile and sun protective and screening behaviors	Sun protective and screening behaviors of FDRs of melanoma survivors	Both interventions increased sun protective and screening behaviors, but tailored intervention evidenced stronger effects (e.g., more likely to apply sunscreen, wear a hat and protective clothing, seek shade, and have provider skin exams)	Regional location and seasonal variation Relying on self-reports
Wu et al. (2018) Pilot study to evaluate the effects associated with an education intervention for at-risk children of melanoma survivors.	<i>N</i> = 18 families (22 parents and 33 children)	Intervention delivery method and content: single-session, in-person behavioral intervention delivered through PowerPoint and short videos; focused on melanoma risk and prevention	Child engagement in preventative behaviors	Significant increase ($p < .05$) in applying sunscreen, seeking shade, and avoiding midday sun, but significant decrease ($p < .05$) in wearing protective clothing	Small sample size Regional location
Tripp et al. (2016) Correlational study to evaluate the effects of interventions designed to improve sun protective and screening behaviors among first-degree relatives of melanoma survivors.	<i>N</i> = 340 Melanoma survivors with children (aged ≤ 12 years)	N/A	Child sunburn (past 6 months) Child sun protection of melanoma survivors: sunscreen, wide-brimmed hat, protective clothing, shade, avoiding midday sun	Children's sunburn prevalence was lower, and sun protection was somewhat more frequent compared to the general population	Limited diversity with participants Lack of standardized measures

Note. FDR = first-degree relative.

and testimonials from melanoma survivors. Also included was information for both the parents and activities for their children. Manne et al. (2010) used tailored content focused on the first-degree relatives' skin cancer risk profile, melanoma facts, sun protection recommendations, and skin exams. The tailored telephone counseling session addressed each participant's specific melanoma risk and current sun protection practices, reviewed melanoma guidelines, and encouraged participants to perform skin examinations.

Bowen et al. (2019) used the *Suntalk* website with hopes of fostering better communication among families impacted by melanoma. The *Suntalk*'s website featured a home page with weekly rotating messages about melanoma prevention, a page dedicated to the participant's specific melanoma risk, a page with "how to" sections, and links to additional sites. The "how to" sections included: how to reduce risk, prevent sun exposure, self-screen, and request provider skin screenings, protect children from sun exposure, and guides on how to speak with providers and other family members. The website also included an interactive chat room for family members. Wu et al. (2018) used developmentally appropriate content for parents and their at-risk children during the single, in-person behavioral education session. The content largely focused on melanoma risk factors and prevention.

Outcomes of Melanoma Prevention

The three randomized controlled trials (Bowen et al., 2019; Gritz et al., 2013; Manne et al., 2010) and the pilot study (Wu et al., 2018) reported variable improvement in sun protective behaviors. Bowen et al. (2019) reported sun protective behaviors significantly improved in the first-degree relatives in the intervention group but not in the control group, particularly wearing a hat ($p = .005$), seeking shade ($p = .008$), and avoiding the sun during peak hours ($p = .010$). Gritz et al. (2013) reported modest improvements with sunscreen reapplication ($p = .002$) and wearing a hat ($p = .045$) at follow-up compared to baseline. Manne et al. (2010) reported improvements to both the generic and tailored intervention arms but evidenced stronger effects on sun protective behaviors over time with the tailored content group. Wu et al. (2018)

reported mixed results regarding sun protective behaviors. The authors reported a significant increase ($p < .05$) in sunscreen application, seeking shade, and avoiding the sun during peak hours. However, they reported a significant decrease ($p < .05$) in wearing protective clothing.

Three studies reported on skin self-examinations or provider skin examinations (Bowen et al., 2019; Manne et al., 2010; Wu et al., 2018). Bowen et al. (2019) reported skin examinations for first-degree relatives significantly increased from 14.7% to 31.7% ($p = .006$) for self-examinations and from 14.7% to 41.7% ($p = .005$) for provider examinations in the intervention arm and decreased in the control arm ($p = .006$ and $p = .005$, respectively). Manne et al. (2010) reported improvements to both intent and frequency of skin examinations by the tailored group. Wu et al. (2018) reported no change in the frequency of skin screening behaviors, but the children reported a significant change ($p < .05$) in thoroughness of skin self-examinations.

The correlational study by Tripp et al. (2016) aimed to better understand the melanoma survivors' characteristics and their children's outcomes as it related to sunburns and sun protective behaviors. Tripp et al. (2016) reported that melanoma survivors intended to protect their children from the sun, although their confidence in sun safety was limited, as 28% of children experienced sunburns in the prior 6 months. Adherence to sun safety was positively correlated with the likelihood of melanoma survivors protecting their children from sun exposure. Additionally, if the survivors experienced sunburns, their children were also more likely to experience them. The results showed variability in sun safety. While 69% of melanoma survivors reported that their children "always" or "frequently" apply sunscreen, engagement in other sun protective behaviors was less than half (i.e., 45% reported "always" or "frequently" limited midday hours and time outdoors and 33% seeking shade).

DISCUSSION

Overall, the studies found that targeted melanoma prevention interventions led to improvements in sun protection and screening behaviors. However, the effectiveness of these interventions differed, which may have depended on how the

interventions were delivered to the target audience. All studies utilized a form of mass communication but varied from print materials to interactive web-based interventions and in-person sessions with PowerPoint presentations and videos. As compared to print materials, the more interactive approaches yielded significant improvement in the adoption of sun protective behaviors. Bowen et al. (2019) reported that a web-based approach was selected for its versatility, flexibility, and potential for broad public reach. Although Bowen et al. (2019) reported internet access as a potential barrier, the U.S. Census Bureau (2024) reported that in 2021, 90% of households had internet subscriptions, an increase from 85% in 2018. Wu et al. (2018) incorporated visuals through PowerPoint presentations and short videos, which were delivered during a 30-minute in-person education session. Both the parents and children learned new information during the intervention, but the study did not report if the families were able to take the educational materials home for later reference. Being able to reference the education materials later could improve recognition and recall of sun protective behaviors.

Conversely, the intervention content did not appear to have as much impact on improving sun protection and screening behaviors. All the studies utilized population-targeted information for the intervention groups. Gritz et al. (2013) and Manne et al. (2010) incorporated both targeted and standard content for the intervention and control groups and observed equally effective results in sun protective and screening behaviors in both groups.

There may have been several barriers to the adoption of sun protective behaviors that were independent of either the delivery method or content of the intervention. Wu et al. (2018) discussed the lack of knowledge or awareness as a major barrier. Health outcomes may be affected by one or more of the five social determinants of health (U.S. Centers for Disease Control and Prevention, 2024). For example, education access and quality, one of the social determinants of health, can be negatively impacted by low health literacy or lack of knowledge. Allen-Meares et al. (2020) reported that low health literacy and lack of knowledge lead to adverse health outcomes. Essentially, if first-degree relatives do not understand the role sun pro-

TECTIVE and screening behaviors play in melanoma prevention, they are less likely to engage in them.

Furthermore, additional research has found associations between low education levels and fatalism in other cancers. For example, Keller et al. (2021) found individuals with low education levels were less likely to get screening mammograms for breast cancer. Gritz et al. (2013) and Tripp et al. (2016) discussed the theme of fatalism (the acceptance that all events are predetermined and therefore inevitable) in relation to cancer and the perception of risk as a barrier to adopting sun protective behaviors (Beeken et al., 2011). Bowen et al. (2019) and Manne et al. (2010) reported on the perception of risk as a major barrier from the first-degree relatives' perspective. Melanoma survivors and their first-degree relatives may disregard intervention content and delivery if they feel it will not help. To help counteract fatalistic beliefs, Bowen et al. (2019), Manne et al. (2010), and Wu et al. (2018) incorporated personalized melanoma risk in their intervention content. Wu et al. (2018) reported the children's perceived risk significantly increased over time, which could lead to improved sun safety. Therefore, first-degree relatives understanding their own individual risk could improve sun protection behaviors.

The target audience may have affected outcomes, as Bowen et al. (2019), Gritz et al. (2013), and Wu et al. (2018) delivered the intervention content to family units, whereas Manne et al. (2010) delivered solely to first-degree relatives. Communication among family members could act as a facilitator or a barrier. Bowen et al. (2019) reported infrequent communication between the melanoma survivor and their first-degree relatives as a major barrier. Wu et al. (2018) agreed that family communication could improve preventative behaviors implementation. Family members can support each other while fostering accountability with sun protective behaviors. Geographic closeness may have also played a role to either support or hinder behaviors.

Additional barriers such as comfort, convenience, and practicality may have impacted the results. Tripp et al. (2016) recommended that sun protective behaviors should be used in combination for the best outcomes, which may be seen as difficult for parents of small children. Three studies

(Gritz et al., 2013; Tripp et al., 2016; Wu et al., 2018) reported barriers regarding the at-risk children, including the child's age, reaction, and possible refusal to sun protective behaviors. For example, younger children may not cooperate with sunscreen application, and older children may refuse to wear sunscreen or protective clothing. Both Gritz et al. (2013) and Wu et al. (2018) focused on the at-risk children, with the thought that sun behaviors in childhood affect them later in life. However, both studies found challenges with using a combination of sun protective behaviors.

In addition, the cost of sunscreen and sun protective clothing may discourage some parents from purchasing these items, or scheduled outdoor activities may not align with shade availability. Lastly, Manne et al. (2010) mentioned that participants found provider skin examinations to be embarrassing. All the aforementioned barriers, including the lack of awareness and/or knowledge, fatalism and perception of risk, as well as the specific intervention content and delivery method, may have contributed to lower sun protective and/or screening behaviors during the studies.

IMPLICATIONS FOR PRACTICE

The discussion highlights the importance of how intervention content is conveyed. The *Slip, Slop, Slap!* campaign was delivered through a catchy jingle that was broadcast across television, which was innovative for its time. Interactive, web-based education works better than plain print. Advancements in technology have enabled communication to be more interconnected and accessible, allowing for ease of information sharing, especially through social media. Sun safety messages could be integrated in a creative way to reach the youth across multiple social media platforms. Future research should focus on more interactive delivery of health-care information.

This integrative review focused on first-degree relatives of melanoma survivors. However, targeted prevention interventions can be applied to other cancers, due to family history of cancer as a risk factor and the fact that family members tend to share health habits (U.S. Centers for Disease Control and Prevention, 2025). For example, first-degree relatives of breast cancer survivors may benefit from targeted prevention interventions

on early detection. Or first-degree relatives of patients with lung cancer may benefit from targeted prevention interventions on smoking cessation.

Advanced practice providers (APPs) in oncology should take every opportunity to communicate cancer risk to first-degree relatives, ideally upon initial diagnosis and during family risk counseling, but also in cancer prevention and survivorship care. Misconceptions about risk (e.g., only fair-skinned individuals are at risk for skin cancer) should be actively addressed. Additionally, APPs in oncology should be knowledgeable about available interventions to foster sun protective and screening behaviors and be prepared to educate not only first-degree relatives but also the entire family. Effective family communication is integral in cancer prevention and overall health outcomes. Education on sun safety should be tailored to the individual, delivered in plain language, and reinforced through demonstration (e.g., proper sunscreen application) to foster consistent sun protective behaviors.

LIMITATIONS

A limitation of this integrative review was the age of the studies, which ranged from 2010 to 2019, predating the integration of widely available technologies and social media as intervention strategies. A second limitation was the scarcity of randomized controlled studies that focused on targeted melanoma prevention interventions in this high-risk group. This could result in a lack of high-quality evidence, leading to uncertainty in clinical decision-making. However, the outcome measures were similar, reducing variability and enhancing the reproducibility of the interventions.

CONCLUSION

The overall goal of this integrative review was to understand the characteristics and effectiveness of targeted melanoma prevention strategies. Variation in educational content did not appear to make an impact on the results, but interactive educational content delivered online that involved the entire family was the optimal intervention. Currently, sun safety objectives are not included in the Healthy People 2030 national objectives. Continued discussion of cancer prevention, especially among first-degree relatives, is warranted with the increasing prevalence of cutaneous melanoma. ●

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Disclosure

The authors have no conflicts of interest to disclose.

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