BeSunSafe: A Sun Safety Program for Freshman Students at The Ohio State University

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BACKGROUND

1. Introduction.

Sun safety and skin cancer, particularly melanoma, represent significant public health concerns in the United States. The primary cause of most skin cancers is excessive exposure to ultraviolet (UV) radiation (Centers for Disease Control and Prevention, 2023a). This invisible type of radiation originates from sources like the sun and artificial sources like tanning beds (Centers for Disease Control and Prevention, 2023a). When the skin is exposed to ultraviolet rays, it can damage skin cells (Centers for Disease Control and Prevention, 2023a). The damage happens when ultraviolet rays cause harm to DNA in skin cells (American Cancer Society, 2019). This harm may be seen in skin damage symptoms or early skin aging, which may include wrinkles, a tough skin texture, and age spots, also known as liver spots (American Cancer Society, 2019).

One type of serious and aggressive skin cancer is melanoma, which begins in the melanocytes that are the cells that give skin its color. Current statistics underscore the urgency of addressing this public health issue. In 2024, in the United States, the latest estimations predict 100,640 new melanoma diagnoses and 8,290 melanoma-related deaths (American Cancer Society, 2024). Annually, about 6 million Americans receive treatment for skin cancer, with an estimated $9 billion spent on treatment each year (Centers for Disease Control and Prevention, 2023b). These figures indicate the widespread prevalence of the disease and the substantial economic burden it places on the United States healthcare system.

The situation in Ohio mirrors this national concern, with some unique characteristics. Ohio's melanoma death rate between 2015 and 2019 was approximately 14% higher than the national average (Ohio Department of Health, 2022). In addition, melanoma incidence and

mortality rates in Ohio were particularly elevated among men and white individuals (Ohio Department of Health, 2022). Despite a doubling in melanoma rates from 2000 to 2019, death rates in Ohio remained stable, likely due to early diagnosis efforts, as 83% of melanomas were detected at an early stage (Ohio Department of Health, 2022). While skin cancers, including melanoma, are predominantly linked to ultraviolet radiation exposure from the sun and artificial sources, the risk is compounded in Ohio, where most of the population is white – a demographic particularly susceptible to skin cancer. Noticeably, a similar demographic is found at The Ohio State University as most of the student population is white. The enrollment statistics for the 2023-2024 year indicated that most of the enrolled students are white and Ohioans (The Ohio State University's Institutional Research and Planning, 2024).

Moreover, Basch et al. (2018) further highlighted the growing concern, projecting that melanoma diagnoses could nearly double in the period 2026-2031, and such a projection is particularly alarming considering that melanoma is among the most common cancers in individuals under age 30. Based on these facts, there is a need for heightened awareness and preventive strategies across all age groups, especially youth like college students. According to data from the 2019 Youth Risk Behavior Survey, sunscreen use is extremely low, as only 15.5% of youth in the United States reported regularly wearing it, and about 4.5% of youth in the United States have reported doing artificial tanning in the past year (Centers for Disease Control and Prevention, 2023b). In addition, in 2020, the percentage of males aged 18 to 29 who reported they always used sunscreen was 8.2%; however, the percentage of females aged 18 to 29 who reported they always used sunscreen was 25.7% (Centers for Disease Control and Prevention Morbidity and Mortality Weekly Report, 2022).

Skin cancer, especially melanoma, is a public health challenge; however, a significant number of skin cancer cases diagnosed each year could be avoided by minimizing skin exposure to excessive sunlight and avoiding the use of artificial sources like indoor tanning equipment (*American Cancer Society*, 2024). This brief background sets the stage for an in-depth exploration of sun safety, skin cancer risks, and ultraviolet exposure among college students, as well as prevention strategies, interventions, challenges, and barriers to effective sun safety programs.

2. Literature Review.

a. Understanding Sun Safety, Skin Cancer Risks, and Ultraviolet Exposure among College Students.

Focusing on college students' sun safety, skin cancer risks, and exposure to ultraviolet radiation, research indicates that people in this age group are at significant risk. The studies by Basch et al. (2012), Basch et al. (2017), and Miller et al. (2022) provide insight into this public health issue. Basch et al. (2012) conducted an online survey of college students (n = 153) at a large university in western New York to investigate participants' sun safety practices, reasons for not using sunscreen, and students' opinions on tanning and sun exposure. The study had a 90.8% response rate, and the authors found that 87.8% of participants reported experiencing excessive sun exposure, with more than three hours in the sun during summer being common. This is compounded by an extremely low use of sunscreen, which was 17.3%, and a high frequency of indoor tanning, with 60% of students reporting recent artificial tanning onset and 41% experiencing more than ten sunburns in their lifetime. Additionally, Basch et al. (2017) further highlighted this issue by conducting a survey assessing 315 college students' knowledge, attitudes, and behaviors toward skin cancer, with a 76% response rate. Basch and her colleagues

(2017) reported students' most utilized sun protective strategies: 27.6% applying sunscreen when sun exposure could last more than an hour, 30.2% wearing ultraviolet protective sunglasses, and 29.5% applying sunscreen again when they are outside in the summer. Basch et al. (2017) also revealed that a quarter of students reported that they had friends or family members who were diagnosed with skin cancer. However, their knowledge about skin cancer prevention remained limited. Miller et al. (2022) also echo these concerns by conducting an online survey to assess recent sunburn occurrences, sun protection habits, knowledge, and perceived obstacles. The researchers focused on 7000 undergraduate students residing in the University of Arizona dormitories in Tucson, AZ, which yielded 530 surveys, resulting in 458 complete surveys after dropping surveys with missing data. Miller and his colleagues indicated a high prevalence of intentional outdoor tanning among college students, with over half engaging in this risky behavior. They also found that the average perceived skin protection knowledge score was 11.99 out of 15, suggesting high awareness, while the average intentional tanning score was 7.12 out of 10. However, despite high awareness of ultraviolet exposure risks, the persistence of intentional tanning among young adults highlights a significant gap between understanding and behavior.

Moreover, other studies by Julian et al. (2020) and Bowers et al. (2021) add further depth to our understanding of sun safety and skin cancer risks among college students. Julian et al. (2020) conducted an online survey investigating college students' perceptions of ultraviolet exposure and sunscreen use, and how these relate to skin cancer risk and protective actions in cloudy climates. Julian and her colleagues found a series of misconceptions about sun safety after conducting an online survey of 335 students (response rate of 23.8%) at the Oregon State University, reporting the following: 10% to 16% had beliefs about the ingredients of sunscreen being toxic or possibly causing cancer, 20% believed in the protective nature of a base tan, and

40% believed tanning is a more natural way to get vitamin D than taking supplements. These misconceptions are linked to risky UV-related behaviors, showing a clear association between beliefs, knowledge gaps, and harmful practices. Bowers et al. (2021) expand on this after conducting a cross-sectional research study surveying 400 college students aged 18 and above at Stony Brook University, evaluating their tanning habits, participation in outdoor activities, use of sun protection, and experiences of sunburn over the previous year. They reported that a significant portion, approximately 55%, experienced sunburns in the past year. In terms of tanning, within the last 12 months, Bowers and her colleague's findings indicate the following: 72% reported unintentional outdoor tanning, 32% reported intentional outdoor tanning, 44% reported only unintentionally tanning outdoors, and 25% reported both unintentional outdoor tanning and intentional outdoor tanning. Bowers and her colleagues (2021) also note that sunburns are common among students involved in various outdoor activities, including sports (non-water sports at 60.1% and water sports at 72.9%) and vacationing (62.2%), pointing to lifestyle factors influencing sun safety behavior.

Regarding limitations, Basch et al. (2012) relied on a single sampling frame and the use of self-reported data, which could introduce self-reporting bias. Miller et al. (2022) findings showed concerns about recall bias, overreporting, and generalizability of results due to geographical differences in the United States. Basch et al. (2017) findings might suffer from the small sample size, self-reporting, and recall bias. Julian et al. (2020) noted limitations due to a small sample size. Bowers et al. (2021) findings might not be generalizable, with concerns about self-reported data leading to reporting and recall biases, missing data, and self-reported skin type. Nonetheless, these findings, combined with those from Basch et al. (2012), Basch et al. (2017), and Miller et al. (2022), paint a comprehensive picture of the challenges in sun safety among

college students. Misconceptions, lack of knowledge, and risky behaviors are prevalent, highlighting the need for effective education and intervention strategies. There is a critical gap between awareness and action, and addressing this gap is crucial in reducing the risk of skin cancer among young adults. These studies underscore the importance of focused, evidence-based interventions that inform and actively engage students in adopting safer sun practices.

b. Prevention Strategies, Interventions, Challenges, and Barriers to Effective Sun Safety.

The United States Preventive Services Taskforce's recommendations emphasize sun safety and skin cancer programs, helping educate high-risk groups on exposure to UV, especially the youth with fair skin (Pope, 2021). This call for public health interventions should justify focusing on college students when implementing sun safety programs, helping them be more sun safe in their daily lives. Studies by Pope (2021), Brady et al. (2022), Miller et al. (2022), Davis et al. (2015), and Mahler (2018) offer a multifaceted perspective on sun safety and skin cancer prevention strategies, highlighting the effectiveness of goal-oriented educational programs and the complexities of addressing barriers to sun safety. For instance, Mahler (2018) conducted a randomized controlled trial (RCT) studying 151 college students in Southern California, evaluating if viewing one's ultraviolet facial photo multiple times versus once influences future sun protection actions. The researcher chose three conditions of ultraviolet facial photo viewing: some view their UV facial photo once, some several times over 2 weeks, and some with no viewing at all. This was immediately followed by an evaluation of emotional responses, perceived skin damage risk, and sun protection plans, with sun protection actions checked via an unexpected phone follow-up after one month. Mahler (2018), in her findings, noted that extra viewings of ultraviolet photos were not associated with increased sun protection behaviors,

compared to control with no viewings of their ultraviolet photos and those with a single viewing of their ultraviolet photos. In addition, Pope (2021) conducted a sun safety video series intervention detailing sunscreen application and risks of tanning, shared weekly on Instagram, which was utilized instead of typical on-campus events. In her study, which is guided by the Health Belief Model (HBM) and Theory of Planned Behavior (TPB), studied 46 college students who volunteered to complete pre/post surveys virtually, emphasizing the critical role of visual educational tools, like video presentations, in changing attitudes and perceptions toward sun safety. Pope (2021) in her findings stated the following changes that happened after the intervention: 71% of the participants reported moving towards using sunscreen with a 15 or higher sun protection factor (SPF) value, and a noticeable decline in those who were unlikely to avoid tanning (from 75% to 43%).

In addition, Brady et al. (2022) further support using diverse, visually engaging educational materials in their research. Brady et al. (2022) examined qualitative data after discussions were held with 38 college students who participated in a skin cancer prevention program. The interviews included multiple topics like students' reactions to information about their personal risk of skin cancer, the intervention's impact on their perceptions of skin cancer risk, the intervention's impact on their actions or plans to improve their sun protection habits, and students' suggestions for enhancing the content or delivery of the intervention. Brady and her colleagues (2022) found that all interviewees mentioned visual learning as a potential improvement to the intervention they participated in. Moreover, Brady et al. (2022) mentioned that interviewees expressed the need for personalized content, emphasizing that such an improvement could boost awareness and motivation for adopting sun protection behaviors. This approach is echoed by Davis et al. (2015) research aimed to increase pre-college students'

awareness of skin damage and cancer caused by UVR overexposure and teach them how to maintain healthy skin, studying 1284 pre-college students. Davis and her colleagues' intervention utilized a 25-minute PowerPoint presentation as well as three interactive activities: try an ultraviolet (UV) skin analyzer to see sun damage, learn about choosing sunscreen wisely, and visualize fabric's sun protection with ultraviolet rays detecting frisbee (also known as UVR-detecting frisbee). Davis et al. (2015) found that their personalized program components may effectively impact adolescents' susceptibility to behavioral intent, perception, and knowledge.

Still, challenges and barriers are common when working with youth like college students. Pope (2021) notes the role of social media in positively portraying the use of artificial ultraviolet sources. This emerges from the youth's understanding that tanning is linked to socially likable appearance and self-worth. On the other hand, the finding of Miller et al. (2022) research offers an interesting insight, suggesting that college students' recognition of barriers to sun safety practices may be low, indicating that the most common barrier was a perception that a tan improves one's attractiveness. This points to the need for interventions that educate, motivate, and empower students to make safer sun-related decisions. These studies highlight the complexity of promoting effective sun safety protection strategies. These also underscore the necessity for approaches that positively impact diverse audiences, addressing the informational gaps and the psychological, social, and cultural factors influencing sun safety behaviors. The integration of innovative educational strategies, visual learning tools, and thoughtful engagement appears crucial in overcoming barriers to effective sun protection strategies, ultimately contributing to more effective skin cancer prevention efforts.

3. METHODS

a. Program Overview, Goals, and Objectives

The BeSunSafe program, aimed at freshmen students at The Ohio State University, focuses on reducing skin cancer incidence through sun safety education. The program is set to address college students' specific needs, providing them with knowledge on protective strategies against harmful ultraviolet radiation and risk factors of overexposure to ultraviolet radiation. Through a brief online educational session accompanied by a pre-session survey, a post-session survey, and a follow-up survey, the program aims to inspire an increase in students' knowledge of protective strategies and risk factors of overexposure to ultraviolet radiation while encouraging the adoption of protective strategies, ultimately reducing skin cancer risk within this population. Following the overview of the BeSunSafe program, Table 1 below provides more details on the program's goals and objectives.

Table 1. The BeSunSafe Program's Goals and Objectives

1. **Goal:**
   a. To reduce skin cancer incidence among The Ohio State University students.
2. **Process Objectives**
   a. **Administrative Objectives**
      i. One months before the start of the intervention activities, the program staff will record a PowerPoint presentation on the risks of overexposure to ultraviolet (UV) rays and protective strategies that help maintain healthy skin.
      ii. One month before the start of the intervention activities, the program staff will finalize all the pre-intervention and post-intervention online surveys to measure changes in participants' knowledge, attitudes, and behaviors related to overexposure to ultraviolet (UV) rays and skin protection.
      iii. One month after the post-intervention online surveys are completed, the program staff will send out all follow-up surveys to record any adoption of protective strategies that help maintain healthy skin.
3. **Impact Objectives**
   a. **Learning Objectives**

i. After the educational session, there will be a 25% increase in participants who can identify at least one protective strategy that helps maintain healthy skin, as measured by comparing responses from pre-intervention (baseline) and post-intervention online surveys.

ii. After the educational session, there will be a 25% increase in participants who can identify at least one risk factor of overexposure to UVR, as measured by comparing responses from pre-intervention (baseline) and post-intervention online surveys.

b. **Behavioral Objectives**

i. One month after the end of the educational session, 25% of the participants who complete the follow-up online survey(s) will report adopting at least one protective strategy that helps maintain healthy skin.

b. Guiding Theory of BeSunSafe's Intervention

The Health Belief Model (HBM) is an ideal behavioral theory to guide the BeSunSafe program, addressing key aspects of sun safety behavior in freshmen students. The theoretical model informs the BeSunSafe program's design by highlighting students' perceptions of skin cancer risk (Perceived Susceptibility) and the seriousness of developing skin cancer (Perceived Severity) while emphasizing the value of protective measures (Perceived Benefits). Additionally, one's emotional response to difficulties that may hinder adoption of recommended behavioral change (Perceived Barriers). The Health Belief Model also underscores the importance of providing motivational cues (Cue to Action) and one's confidence in one's ability to properly carry out a behavior like checking skin regularly (Self-efficacy). These constructs, presented in Table 2, inform the BeSunSafe program's learning material, the intervention's presentation.

Table 2. Health Belief Model's Constructs and Examples from Learning Material.

Construct	Examples from Learning Material

Perceived Susceptibility	(Statistics of Melanoma; slide #9) "… a recent study suggested that the number of individuals diagnosed with melanoma will nearly double in 2026-2031. Melanoma is among the most common cancers in people under 30 years of age." (Basch et al., 2018)
Perceived Severity	(Cancer; slide #7) The most significant risk factor for all skin cancers, including melanoma, is exposure to ultraviolet (UV) radiation from the sun and artificial sources like tanning beds.
Perceived Benefits	(Our Skin; slide #4) Skin's protective roles and its significance in overall health and well-being + benefits of protecting one's skin —> Reducing the possibility of developing skin cancer
Perceived Barriers	(Sun Safety Tips; slide #20) Recognizing that wearing long sleeves, pants, and all-around brim hats can be inconvenient or uncomfortable in hot weather, yet are crucial for effective protection against harmful ultraviolet (UV) rays.
Cue to Action	(Sun Safety Tips; slide #21) "Examine your skin monthly for new or changing moles, spots, or bumps. Use the ABCDEs Method to check moles or spots on your skin: A for Asymmetry, B for Border, C for Color, D for Diameter, E for Evolving."
Self-efficacy	(Sun Safety Tips; slide #21) Learning the ABCDEs method can encourage self-examination of moles and empower individuals to perform self-checks confidently, enhancing belief in their ability to recognize early signs of skin cancer.

c. BeSunSafe's PRECEDE-PROCEED Model

The PRECEDE-PROCEED model (Appendix A) was used to plan the BeSunSafe program. This model provides a comprehensive framework to understand and address various factors influencing health behaviors. In the context of the BeSunSafe program, the PRECEDE part of the model presents the social assessment, the epidemiological, behavioral, and

environmental assessment, and the educational and ecological assessment for the BeSunSafe program. The model also guides the identification of predisposing, reinforcing, and enabling factors that affect sun safety behaviors among college students. In addition, it helps assess the intended population's specific needs, helping inform the program's design. In the PROCEED part of the BeSunSafe program's PRECEDE-PROCEED Model (phase 5 to phase 8), implementation and evaluation of the intervention take place. In the process evaluation phase, the BeSunSafe program's team will monitor the program's implementation, ensuring that the program's activities are conducted as planned. In the impact evaluation phase, the BeSunSafe program's team will assess the immediate effects of the program on participants' knowledge, attitudes, and behaviors regarding sun safety. This phase is crucial for understanding the program's effectiveness in changing sun safety behaviors in the short term. The evaluation process ensures the program's goals are met and provides valuable feedback for continuous improvement, ensuring the BeSunSafe program effectively promotes sun safety behaviors among college students.

d. Recruitment for BeSunSafe's Program

Recruitment for the BeSunSafe program will benefit from the mandatory orientation for the incoming Ohio State University freshmen students. Such a strategy guarantees that the program effectively reaches its intended audience, as participation in the university's orientation is mandatory for all new students.

e. BeSunSafe's Program Setting and Timeline

The proposed BeSunSafe program at The Ohio State University is planned and designed to be an integrated component of the freshman mandatory orientation. The intervention will be delivered in an accessible online format, for example, through Carmen. This setting ensures that

all incoming freshman students can participate, regardless of location or schedule, as it offers flexibility and convenience. Regarding the timeline in (Appendix F), freshman mandatory orientation at The Ohio State University is usually scheduled to start at the end of the first week of August, covering a period of ten days to accommodate all freshman students. As a result, the proposed BeSunSafe program would start at that time as students go through the different components of the freshman mandatory orientation, including the proposed BeSunSafe program.

f. BeSunSafe's Intervention Plan

The proposed BeSunSafe program is based on information from a review of the scientific literature. The intervention will start with an online pre-session survey that gathers participants' information like email address, age, gender, race, and history of cancer, if applicable. It will also record data on participants' previous knowledge of sun protective strategies, risk factors of exposure to ultraviolet radiation, and protective sun safety behaviors.

Since the examined literature is supportive of visual educational materials, the BeSunSafe's intervention will have a 30-minute recorded PowerPoint presentation (Appendix B). The content includes background information presenting recent statistics to explain why sun safety is a public health concern, including a projected increase in melanoma cases and the significant role of ultraviolet radiation exposure as a risk factor for all skin cancers. It highlights Ohio's higher melanoma incidence and mortality rates compared to the national average, underscoring the urgency of the issue. The presentation also includes the skin's role, skin's structure, skin's function, and the Fitzpatrick Classification of Skin Types. In addition, it includes types of skin cancer, focusing on melanoma, basal cell carcinoma, and squamous cell carcinoma. The presentation provides sun safety tips, going in-depth when explaining the A.C.E Method (Avoid, Cover Up, Examine). After the educational session, an online post-session survey will

record any changes in participants' knowledge of sun protective strategies, risk factors of exposure to ultraviolet radiation, and protective sun safety behaviors. Lastly, a month later, the BeSunSafe program will conclude with an online follow-up survey that records data on any changes in behaviors related to adopting protective sun safety behaviors. The needed budget and budget justification are included (Appendix D) and (Appendix E), respectively, ensuring that the program will have sufficient resources to implement it.

g. BeSunSafe's Data Collection, Data Analysis, and Evaluation Plan

During implementation, phase 5 of the PRECEDE-PROCEED Model, the proposed BeSunSafe program will collect quantitative data from students who agree to participate in the program using three surveys: pre-session, post-session, and a follow-up survey that will be sent a month after the completion of the post-session survey. Participants who agree to participate in the program will complete the pre-session survey, watch the recorded PowerPoint presentation, and complete the post-session survey. Similarly, participants who agree to participate in the program will complete the follow-up survey.

The pre-session survey includes 20 questions starting with demographic characteristics including age, gender, race, personal history of cancer, and family history of cancer. The survey includes questions and statements on sunscreen type, sunscreen use, tanning, sunbathing, sunburns, and protective strategies like the A.C.E (Avoid, Cover, and Examine) method. This will help record baseline data on students' knowledge regarding protective strategies that help maintain healthy skin, and risk factors of overexposure to ultraviolet rays. In the pre-session survey, participants' responses to knowledge-based questions and statements (7, 8, 9, 11, 12, 13, 14, 15, 16, 18, and 19) on sun protection strategies and ultraviolet radiation risk factors will be quantitatively scored, with correct answers assigned 1 point and incorrect answers 0 points. The

range is 0 to 11 for the knowledge questions with higher scores indicating better knowledge. Behavior items (10, 17, and 20) at baseline, such as more frequent application of sunscreen or seeking shade, scored on a scale from 0 (Never) to 4 (Always) with higher scores indicating better sun safety behavior.

Similarly, the post-session survey will include 14 questions and statements to measure changes in students' knowledge regarding protective strategies that help maintain healthy skin and risk factors of overexposure to ultraviolet rays, compared to corresponding questions and statements from the pre-session survey. In the post-session survey, participants' responses to knowledge-based questions and statements (1, 3, 4, 5, 6, 7, 8, 9, 10, 11, and 12) concerning sun protection strategies and ultraviolet radiation risk factors will be quantitatively evaluated, with correct responses receiving 1 point and incorrect responses receiving 0 points. The range is similar to the one utilized in the pre-session survey, which is 0 to 11 for the knowledge questions with higher scores indicating better knowledge. Then, to assess significant changes in knowledge, paired t-tests will be used to compare mean knowledge scores from pre-session to post-session surveys. Such a statistical method is appropriate for analyzing the matched data provided by the same participants at two different time points, offering insights into the direct impact of the educational content. Survey items regarding intended behaviors towards sun safety (2, 13, and 14) will be scored to reflect changes on a scale from 1 (Less likely than before) to 4 (Much more likely), with higher scores (3 and 4) indicating an increased likelihood of the intended sun safety behavior.

In the follow-up survey, conducted one month after the educational session, participants' engagement in protective behaviors will be directly assessed through their responses to questions 1-4, evaluating the frequency of sunscreen application, wearing protective clothing, checking the

skin for signs of cancer, and modifying routines to reduce UV exposure. These behaviors are scored on a scale from 0 (Never) to 4 (Always) to quantify the adoption of protective strategies. (Appendix C) includes all the mentioned surveys, with an answer key if applicable.

For impact objectives, the proposed BeSunSafe program will be evaluated against the set objectives by measuring the percentage increase in participants correctly identifying at least one sun protective strategy and the percentage increase in participants correctly identifying at least one risk factor associated with ultraviolet exposure. The BeSunSafe program will be evaluated by measuring the adoption of sun safety practices, as indicated by the follow-up survey responses. For process objectives, the BeSunSafe program will document the time and date for when the presentation is recorded and when all the surveys are finalized. This will allow the BeSunSafe program to determine if the program objectives are met.

4. Discussion

The proposed BeSunSafe program, developed for freshman students at Ohio State University, represents a step in addressing the public health issues of skin cancer and excessive ultraviolet radiation exposure among college-age adults (Basch et al., 2012). This developed program aligns with the urgent need for goal-oriented educational interventions, as highlighted by the reviewed scientific literature and skin cancer incidence, mortality, and the low rates of sun safety practices among young adults, especially college students (Basch et al., 2012, 2017, 2018; Miller et al., 2022; Ohio Department of Health, 2022). The developed program is guided by health theory and provides information about the prevention of skin cancer. Thus, the developed program may have better success in reaching the proposed program objectives.

a. Limitations

The developed program has some limitations. The BeSunSafe program has not received input from college students in the development process and has not been pilot tested. The recruitment process for freshmen students is dependent on requirements for OSU orientation. The developed program has a focus on education and does not provide individuals with products (e.g., suntan lotion, proper clothing) to prevent skin cancer. In addition, there is a short follow-up period and the reliance on self-reported data, which may introduce biases affecting the interpretation of the findings. Finally, while the program is planned to successfully reach its intended audience of freshman students at The Ohio State University, it may be difficult to generalize the results to other universities in different geographical areas in the United States.

b. Recommendations

If implemented as developed, the BeSunSafe program will likely lead to educational and behavioral benefits to college students. Future iterations of the BeSunSafe program should consider extending the follow-up period and incorporating qualitative research methods to mitigate self-reporting biases and deepen understanding of attitudes and behaviors towards sun safety. The proposed BeSunSafe program has the potential to contribute valuable insights to the ongoing efforts to overcome skin cancer risks associated with ultraviolet radiation. Future programs should build on these foundations, exploring innovative delivery methods and expanding reach to further mitigate the public health challenge posed by skin cancer.

5. Conclusion

The proposed BeSunSafe program will address public health concerns regarding skin cancer and ultraviolet radiation and the adoption of sun protective strategies for college students. The BeSunSafe program was guided by the Health Belief Model and has the potential to make a positive impact on students' knowledge and behaviors.

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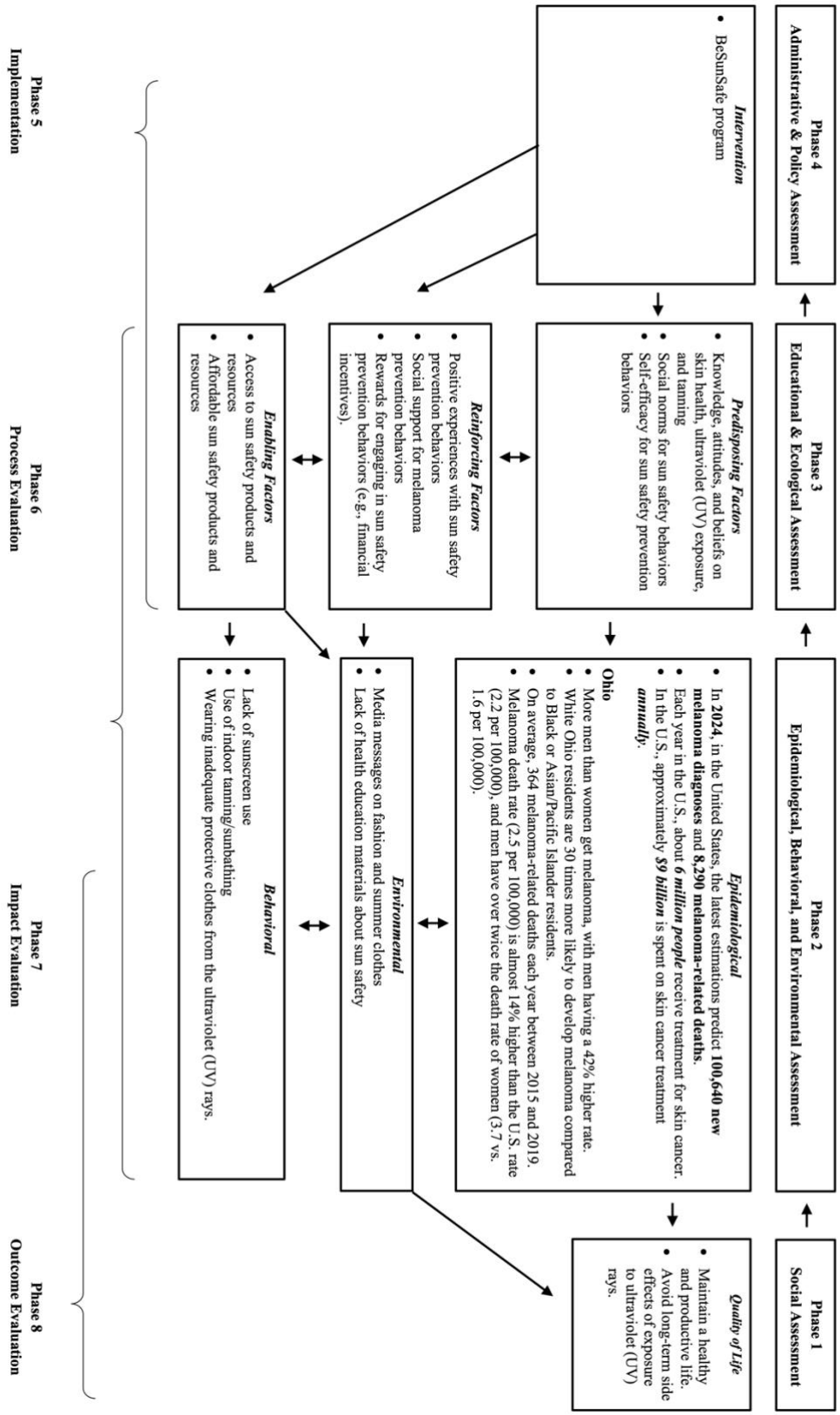
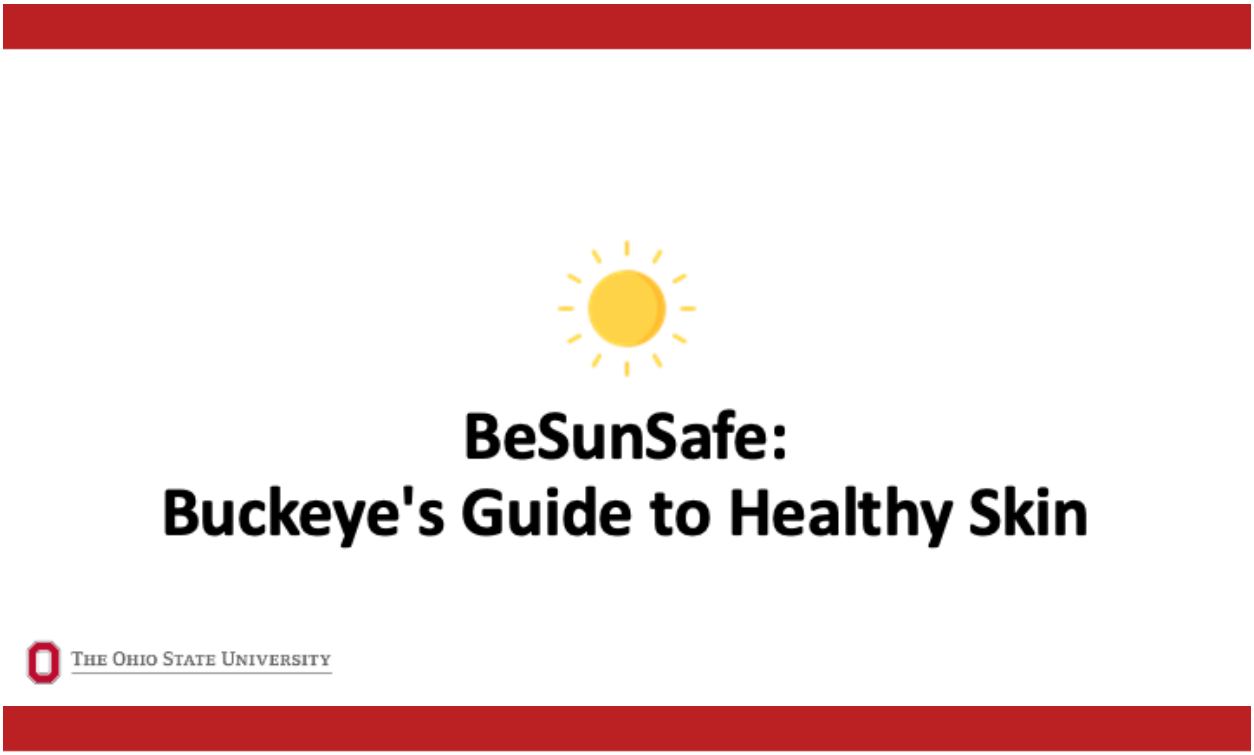
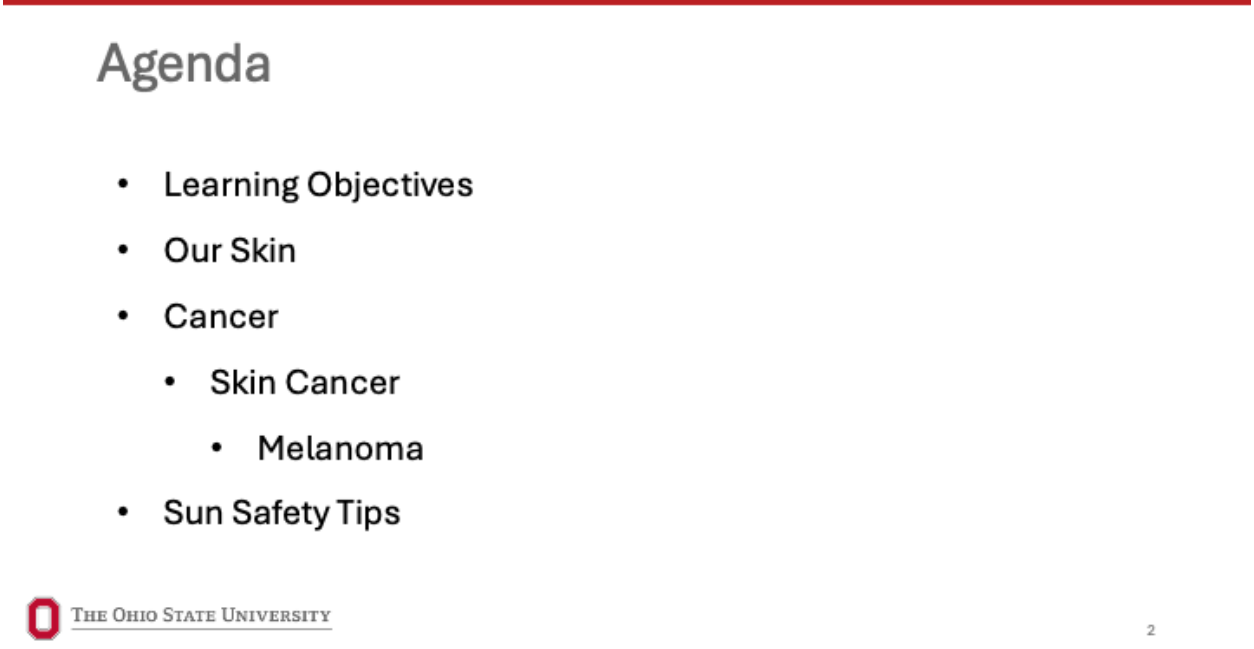
Appendix A. BeSunSafe's PRECEDE-PROCEED Model.



Appendix B. BeSunSafe's PowerPoint Presentation Slides.





Learning Objectives

- Understand that the sun or other sources of ultraviolet (UV) rays can harm our skin and even cause skin cancer.
- Learn what we can do to protect our skin and keep it healthy.

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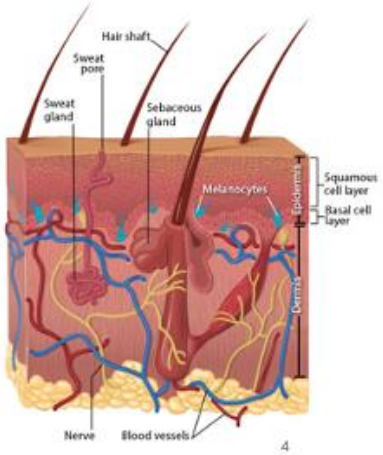
Our Skin

- **Skin** is the **largest organ** in the human body.
  - Has three layers: the top layer (**epidermis**), the middle layer (**dermis**), and the bottom layer (**hypodermis**)."
  - Acts like **a shield** for our bodies, keeping our other organs **safe**.
  - Helps **control** how hot or cold we feel.
  - Lets us **feel things** like touch, heat, and cold.
  - Helps our bodies make **vitamin D** when we are in the sunlight.



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Our Skin cont.

- Fitzpatrick Classification of Skin Types

Type I	White skin. Always burns, never tans.	
Type II	Fair skin. Always burns, tans with difficulty.	
Type III	Average skin color. Sometimes mild burn, tan about average.	
Type IV	Light-brown skin. Rarely burns. Tans easily.	
Type V	Brown skin. Never burns. Tans very easily.	
Type VI	Black skin. Heavily pigmented. Never burns, tans very easily.	

Cancer

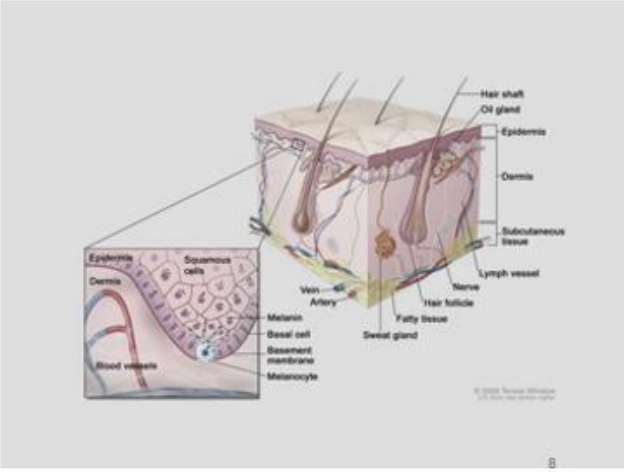
- **Definition**: Cancer describes diseases where abnormal cells proliferate uncontrollably and have the capability to spread into surrounding tissues.
- Over 100 distinct types of cancer exist, with most being identified based on the organ or cell type where they originate, like skin cancer.
- Skin cancer includes Melanoma - the most aggressive or severe type of skin cancer, Basal Cell Carcinoma, and Squamous Cell Carcinoma.

Cancer

- The **most significant risk factor** for all skin cancers, including melanoma, is **exposure to ultraviolet (UV) radiation** from the **sun** and **artificial sources** like **tanning beds**.

Types of Skin Cancer

- Melanoma (most **aggressive** or **severe** type of skin cancer).



Statistics of Melanoma

- "... a recent study suggested that the **number of individuals diagnosed with melanoma** will **nearly double in 2026-2031**. **Melanoma** is among the **most common cancers** in people **under 30** years of age." (Basch et al., 2018)

Additional Information

- Ohio's melanoma death rate from 2015 to 2019 was **almost 14% higher than the national rate**.
- In Ohio, both **melanoma incidence and mortality rates** were **higher** for **men** and **white** individuals in 2015-2019.

Additional Information

- From 2000 to 2019, **melanoma** rates **doubled** in Ohio, while melanoma death rates remained stable.

- In Ohio, **83%** of **melanomas** are diagnosed at **an early stage**, and about **8%** are diagnosed at **a late stage**.

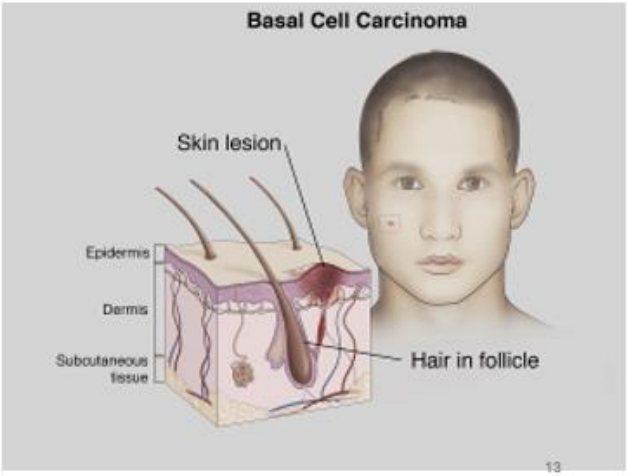
Additional Information

Table.1 Average Annual Number and Age-Adjusted Rates of Melanoma Cases and Deaths per 100,000 Population by Sex, Race, and Age Group, Ohio and the United States, 2015-2019.

		Incidence			Mortality		
		Ohio Cases	Ohio Rate	U.S. Rate	Ohio Deaths	Ohio Rate	U.S. Rate
Total		3,564	25.6	21.5	364	2.5	2.2
Sex	Male	2,027	31.2	27.6	233	3.7	3.2
	Female	1,537	21.9	17.0	131	1.6	1.4
Race	White	3,164	26.1	25.5	359	2.8	2.5
	Black	11	0.8	0.9	4	0.2	0.3
	Asian/Pacific Islander	2	0.9	1.3	1	*	0.3
Age Group	<65	1,751	15.5	11.8	126	1.1	0.8
	65+	1,813	95.5	88.5	238	12.6	11.3

Types of Skin Cancer

- Basal Cell Carcinoma.



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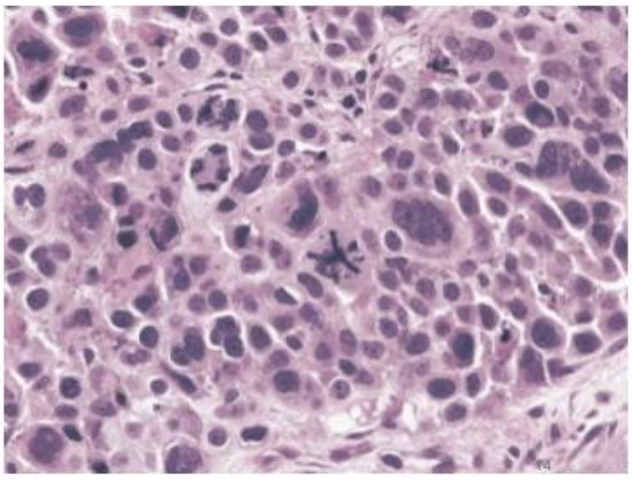
Types of Skin Cancer

- Squamous Cell Carcinoma.



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Sun Safety Tips

- **Sun Protection Factor (SPF):**
  - This indicates the amount of solar energy (ultraviolet radiation) needed to cause sunburn on skin with sunscreen compared to skin without it.

Sun Safety Tips

- We can use the **A.C.E** Method to be Sun Safe when we are outside:

A – Avoid!

C – Cover Up!

E – Examine!

Sun Safety Tips

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- **A – Avoid!**
  - Ultraviolet Radiation index

0 - 2	3 - 5	6 - 7	8 - 10	11+
Low	**Moderate**	**High**	**Very High**	**Extreme**

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Sun Safety Tips

- **A – Avoid!**
  - Exposure to ultraviolet (UV) rays is influenced by latitude, seasons, altitude, ozone layer depletion, and reflection.

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Sun Safety Tips

- **A – Avoid!**
  - The **sun's ultraviolet** (UV) **rays** are usually the **strongest** between **10 in the morning** and **4 in the afternoon** when we are on daylight saving time. If it is standard time, the strongest ultraviolet (UV) rays are from **9 in the morning** to **3 in the afternoon**.
  - Benefit from shade – it is important to stay in shaded areas as much as possible.

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Sun Safety Tips

- **C – Cover Up!**
  - Clothing – choose **long sleeves** and **pants** with a **tight weave,** no matter how hot or cold the weather is.
  - Hat – choose **hats** with all-around brims, **tightly woven**.
  - Sunglasses – protect our eyes from ultraviolet (UV) rays.
  - Sunscreen – make sure to have **sunscreen**, **lip balm**, and **makeup** with an **SPF of 30+**.

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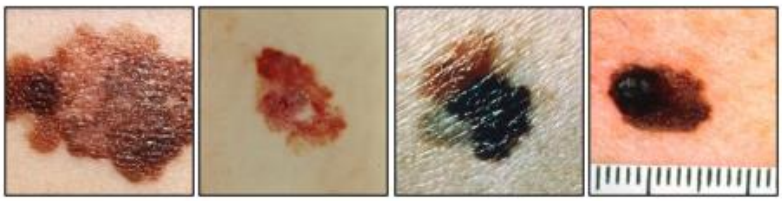
Sun Safety Tips

- **E – Examine!**
  - We should examine our skin monthly for new or changing moles, spots, or bumps, using the **ABCDE**s Method:

A for **Asymmetry** **B** for **Border** **C** for **Color**

D for **Diameter** **E** for **Evolving**



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Sun Safety Tips

- **Remember always to…**

A – Avoid!

C – Cover Up!

E – Examine!

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Thank You

Appendix C. BeSunSafe's Surveys.

- **Pre-session Survey**

Welcome to the BeSunSafe: Buckeye's Guide to Healthy Skin Program. The program includes a:

A) A brief survey before the presentation
B) 30-minute video presentation
C) A brief survey after the presentation
D) A brief survey one month after the presentation.

- The answers you give on the surveys will be kept private. NO ONE other than the program staff will know how you answered the questions.
- If you are unsure about how to answer a question, please give the best answer you can.
- Please mark only one answer to each question or statement.
- Completing this survey is voluntary. You may skip any question you do not want to answer.

Thank you for agreeing to complete this survey. If you have any questions, please call us at [PHONE NUMBER] or send an email to xxxx.1@osu.edu

Do you consent to participate in this program? Your answers will help us understand your initial knowledge about sun safety and skin cancer. Your responses will remain confidential and will not be used for any other purpose.

- Yes, I consent to participate in the program.
- No, I do not consent to participate in the program. (If chosen, the survey will stop here)

If you agree to participate, please click 'Next' and continue with the following questions. If you do not agree to participate, thank you for your time, and we wish you all the best.

Please mark ONLY ONE ANSWER to each question or statement.

1. What is your name.#@osu.edu email?
{text box}

2. What is your age?

- Under 18 years old
- 18 years old
- 19 years old
- 20 years old
- 21 years old
- 22 years old
- 23 years old
- 24 years old
- 25 years old and older

3. What is your gender?

- Male
- Female
- Non-binary
- I prefer not to say.

4. Please indicate your race.

- White
- Black or African American
- American Indian or Alaska Native
- Asian
- Pacific Islander
- Other (please specify): {text box}

5. Have you ever been diagnosed with cancer?

- Yes
  - If yes, (please specify what type of cancer): {text box}
- No

6. Have any members of your family ever been diagnosed with cancer?

- Yes
  - If yes, (please specify what type of cancer): {text box}
- No

7. What *Sun Protection Factor* level is sufficient for adequate sun protection?

- Less than SPF 10
- SPF 10
- SPF 15
- SPF 30 or higher (correct answer)

8. Sunburn protection increases as the *Sun Protection Factor* (SPF) value increases.

- True. (correct answer)
- False

9. A sunburn can occur when unprotected skin is exposed to ultraviolet radiation either from the sun or artificial sources like tanning beds.

- True. (correct answer)
- False

10. How often do you apply sunscreen when planning to be outside?

- Always
- Often
- Sometimes
- Rarely
- Never

11. Sunbathing cannot lead to sunburn of unprotected skin.

- True
- False (correct answer)

12. Tanning beds are a safe alternative to sunbathing.

- True
- False (correct answer)

13. What do ABCDEs of melanoma detection stand for?

- Asymmetry, Border, Color, Diameter, and Evolving (correct answer)
- Asymmetry, Brightness, Clarity, Depth, and Evolving
- Area, Brightness, Color, Dimension, and Elevation
- Asymmetry, Border, Clarity, Depth, and Expansion

14. To be sun safe, you must practice the A.C.E method. What does A.C.E. stand for?

- Avoid, Cover Up, and Examine. (correct answer)
- Absorb, Check, and Educate.
- Apply, Cool down, and Evaluate.
- Acknowledge, Clothe, and Engage.

15. The sun's ultraviolet radiation (UV) is the strongest during which period?

- 10 a.m. to 4 p.m. (correct answer)
- 7 a.m. to 1 p.m.
- 9 a.m. to 1 p.m.
- 8 a.m. to 12 p.m.

16. Seeking shade when you are outside can prevent unprotected skin from getting sunburned.

- True (correct answer)
- False

17. How often do you seek shade when you are outside?

- Always
- Often
- Sometimes
- Rarely
- Never

18. Tightly woven fabrics (clothes) that cover the skin, like long-sleeved shirts and long pants, cannot protect it from sunburn.

- True
- False (correct answer)

19. Darker colors fabrics (clothes) may offer more protection than lighter colors.

- True (correct answer)
- False

20. How often do you wear tightly woven fabrics (clothes) when you go outside?

- Always
- Often
- Sometimes

- Rarely
- Never

Thank you for your time. We appreciate your participation in this survey.

- **Post-session Survey**

Please mark ONLY ONE ANSWER to each question or statement.

1. What *Sun Protection Factor* level is sufficient for adequate sun protection?

- Less than SPF 10
- SPF 10
- SPF 15
- SPF 30 or higher (correct answer)

2. How likely is it that you will use sunscreen before going outdoors?

- Much more likely
- Somewhat more likely
- About the same as before
- Less likely than before

3. Sunburn protection increases as the *Sun Protection Factor* (SPF) value increases.

- True (correct answer)
- False

4. A sunburn can occur when unprotected skin is exposed to ultraviolet radiation either from the sun or artificial sources like tanning beds.

- True (correct answer)
- False

5. Seeking shade when you are outside can prevent unprotected skin from getting sunburned.

- True (correct answer)
- False

6. Sunbathing cannot lead to sunburn of unprotected skin.

- True
- False (correct answer)

7. Tanning beds are a safe alternative to sunbathing.

- True
- False (correct answer)

8. What do ABCDEs of melanoma detection stand for?

- Asymmetry, Border, Color, Diameter, and Evolving (correct answer)
- Asymmetry, Brightness, Clarity, Depth, and Evolving
- Area, Brightness, Color, Dimension, and Elevation

- Asymmetry, Border, Clarity, Depth, and Expansion

9. To be sun safe, you must practice the A.C.E method. What does A.C.E. stand for?

- Avoid, Cover Up, and Examine. (correct answer)
- Absorb, Check, and Educate.
- Apply, Cool down, and Evaluate.
- Acknowledge, Clothe, and Engage.

10. The sun's ultraviolet radiation (UV) is the strongest during which period?

- 10 a.m. to 4 p.m. (correct answer)
- 7 a.m. to 1 p.m.
- 9 a.m. to 1 p.m.
- 8 a.m. to 12 p.m.

11. Tightly woven fabrics (clothes) that cover the skin, like long-sleeved shirts and long pants, cannot protect it from sunburn.

- True
- False (correct answer)

12. Darker colors fabrics (clothes) may offer more protection than lighter colors.

- True (correct answer)
- False

13. How likely are you to wear tightly woven fabrics (clothes) that cover the skin, like long-sleeved shirts and long pants?

- Much more likely
- Somewhat more likely
- About the same as before
- Less likely than before

14. How likely is it that you will seek shade when you are outside?

- Much more likely
- Somewhat more likely
- About the same as before
- Less likely than before

Thank you for your time. We appreciate your participation in this survey.

- **Follow-up Survey**

Please mark ONLY ONE ANSWER to each question or statement.

1. Since attending the sun safety educational session, how often have you applied sunscreen before going outside?

- Always
- Often
- Sometimes
- Rarely

- Never

2. Since attending the sun safety educational session, how often have you worn protective clothing (like long sleeves, wide-brimmed hats, and sunglasses) when out in the sun?

- Always
- Often
- Sometimes
- Rarely
- Never

3. Since attending the sun safety educational session, how often have you checked your skin for signs of cancer using the ABCDE method?

- Always
- Often
- Sometimes
- Rarely
- Never

4. Since attending the sun safety educational session, how often have you made any changes to your daily routine to reduce exposure to UV rays?

- Always
- Often
- Sometimes
- Rarely
- Never

Thank you for your time. We appreciate your participation in this survey.

Appendix D. BeSunSafe's Budget.

BUDGET FORM				
Time	**From:**	**01/01/2024**	**To:**	**12/31/2024**

Personnel				
Title	**% Effort**	**Salary/Hourly Rate**	**Fringe Benefits**	**Total Requested**
Program Advisor/Coordinator (Associate Professor from the OSU's CPH)	20%	$36,000	$1,800	$9,000
Program Planner MPH Student (HBHP)	Hourly (130 hours)	$15.50	$1000	$3,015
Program Biostatistician MPH Student (Biostatistician)	Hourly (130 hours)	$15.50	$1000	$3,015
				$15,030

Supplies	
Description	**Total Requested**
Not Applicable	$0

Miscellaneous	
Description	**Total Requested**
Not Applicable	$0

Total Amount Requested	$15,030

Appendix E. BeSunSafe's Budget Justification.

A. Personnel:

- **Program Advisor/Coordinator:** The advisor/coordinator will oversee the BeSunSafe program and ensure all proposed plans are carried out correctly. The advisor/coordinator will also be responsible for managing the project and the project budget. Also, the advisor/coordinator will ensure all project requirements are met. The requested salary of $9,000 reflects a part-time position at 20% effort, which is appropriate given the scope and complexity of the project.
- **Master of Public Health Student (preferably with experience in HPHB):** This master's student will be responsible for developing the BeSunSafe program materials, such as developing the PowerPoint presentation, recording it, and developing survey questions. The requested hourly compensation represents a part-time position of 130 hours in 6 months.
- **Master of Public Health Student (preferably with experience in Biostatistics):** This master's student will be responsible for assisting with various project components like survey questions development, data collection, data analysis, and evaluation. The requested hourly compensation represents a part-time position of 130 hours in 6 months.

B. Supplies:

No supplies are needed for the program implementation.

C. Miscellaneous:

No extra funds are needed.

Appendix F. BeSunSafe's Timeline.

BeSunSafe's Program Timeline				
Activities / Months	**July 2024**	**August 2024**	**September 2024**	**October 2024**
PowerPoint Recording	**X** Week 1			
Surveys Completion	**X** Week 1			
Program (Educational Session and Data Collection from Surveys)		**X** Week 1		
Follow-up Survey			**X** Week 1	
Data Analysis				**X**
Data Evaluation	**X**	**X**	**X**	**X**