

Sun Protective Behavior and Sunburn in Context


**Presentation to the National Academies Committee on
Environmental Impact of Currently Marketed Sunscreens and
Potential Human Impacts of Changes in Sunscreen Usage**

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Skin Cancer Intervention across the Cancer Control Continuum (SCI-3C) Conceptual Model



Cancer control continuum goal:	Prevention	Detection	Diagnosis	Treatment	Survivorship
Medical time-point:	Prevention	Screening	Pretreatment	Treatment	Posttreatment
Examples of behavioral intervention targets					
Behavioral targets	Sun-protection practices	Skin examination completion	Behavior-aiding treatment	Treatment adherence	Sun-protection practices, screening
Clinically related targets	Sunburn	Nevi	Distress	Distress, adverse event	Quality of life, sunburn, recurrence

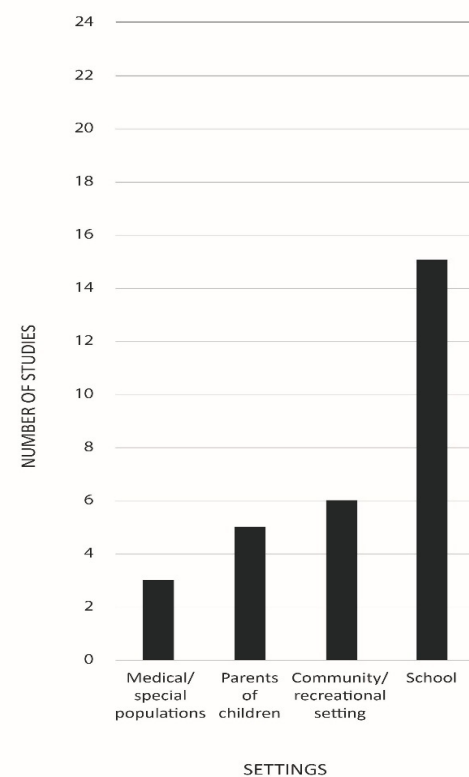
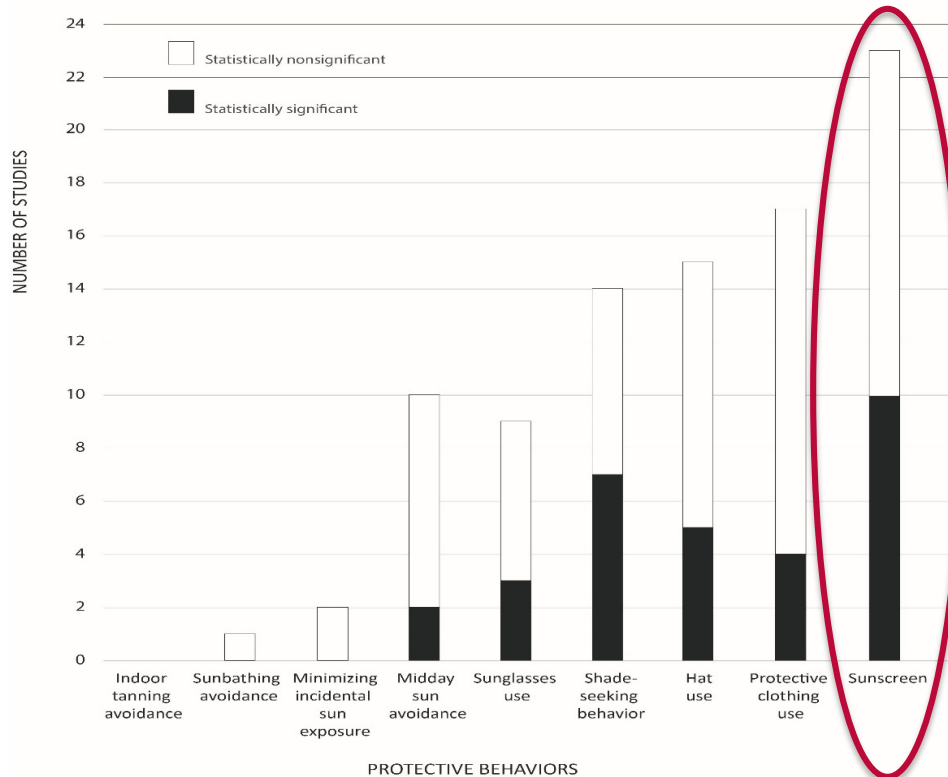


Logic model relating to:
Behavioral intervention
Proximal targets
Distal outcomes



Source: [JAMA Dermatol.](#) 2017 May;
153(5): 398–405

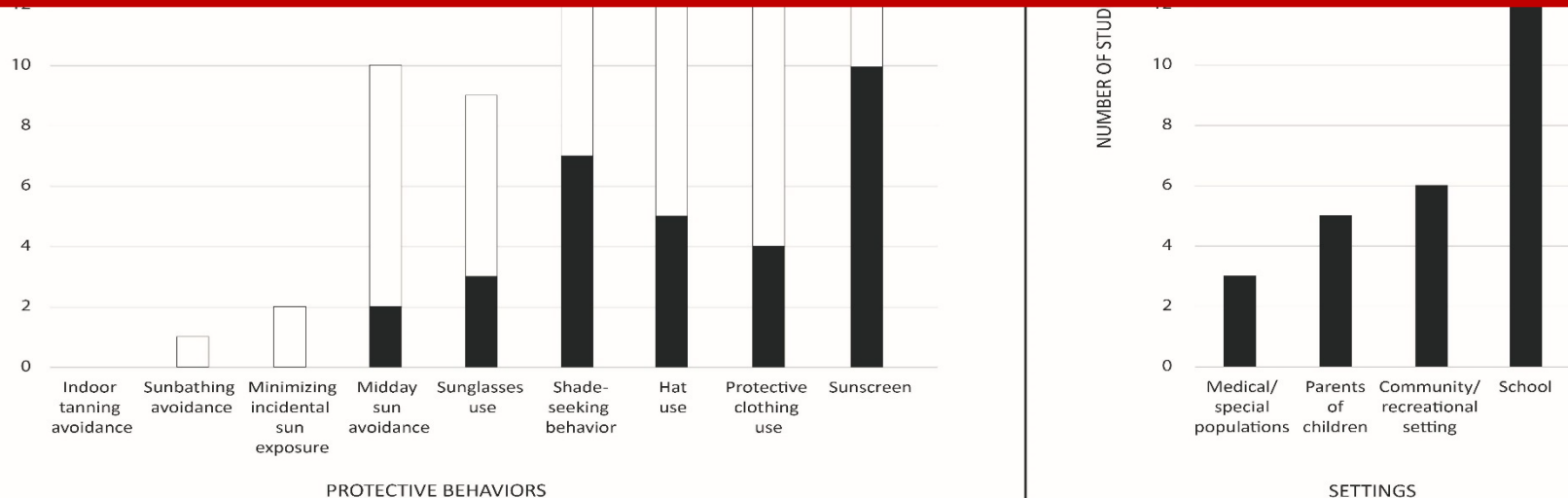
Frequency of Intervention Studies (2000 – 2015) Reporting Skin Cancer Prevention Behaviors among **Youth** and Intervention Setting



Source: Prev Med. 2018 Jun; 111: 442–450.

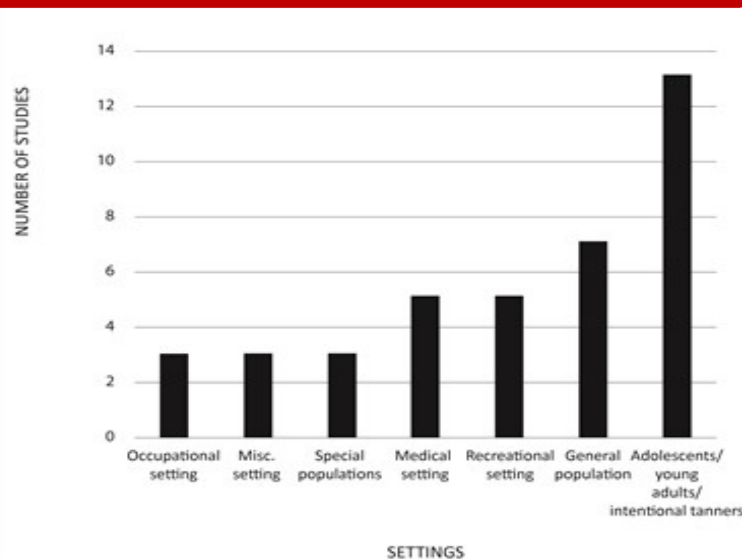
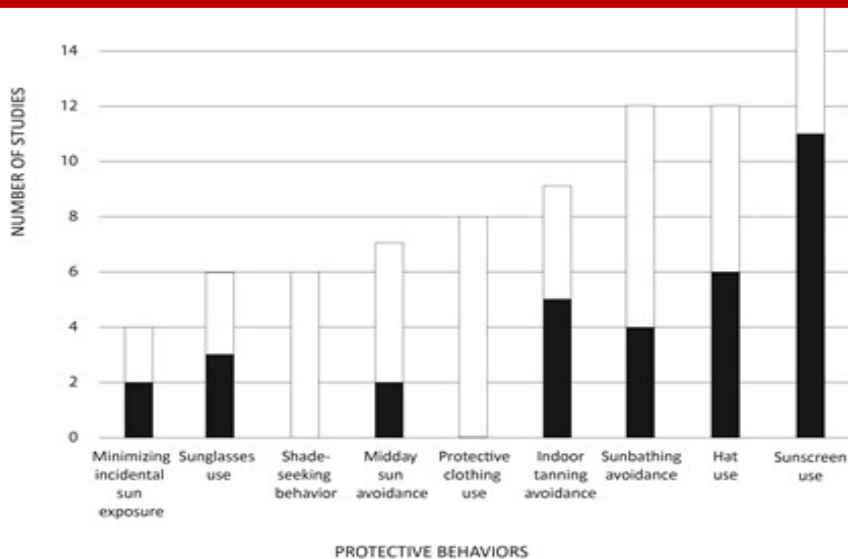
Frequency of Intervention Studies (2000 – 2015) Reporting Skin Cancer Prevention Behaviors among **Youth** and Intervention Setting

1. Statistically significant change in approximately 20-45% of the SELF-REPORT outcomes
2. Only 58% of studies included CLINICALLY RELEVANT (e.g., sunburn) or objective outcomes
3. Less 20% of the interventions changed CLINICALLY RELEVANT outcomes



Intervention Studies (2000 – 2015) Reporting Skin Cancer Prevention Behaviors among **Adults** and Intervention Setting

1. Statistically significant change in 44% of the SELF-REPORT outcomes
2. Only 33 % of studies included CLINICALLY RELEVANT (e.g., sunburn) or objective outcomes
3. Less 1/3 of these interventions changed CLINICALLY RELEVANT outcomes



How can we better understand sunburn and sun protective behaviors?

Health Information National Trends Survey (HINTS5-Cycle3)

- Nationally representative survey (mail and online)
- Noninstitutionalized adults in the United States
- Sample (n = 5,438)
- Collects data on the public's:
 - use of cancer-related information
 - Cancer-related health behavior
 - Cancer risk perception and other cognitive-affective constructs
- Details about the survey methods available online:

<https://hints.cancer.gov>



Health Information National Trends Survey (HINTS5-Cycle3)

Sunburn

During the past 12 months, how many times have you had a sunburn (even a small part of your skin turns red or hurts for 12 hours or more) from too much sun exposure?

- Response Option: Enter__ __ **Sunburns in past 12 months**

IF 0 THEN GO TO SECTION

Health Information Trends Survey (HINTS5-Cycle3)

Sunburn Context

On the most recent time you were sunburned, what were you doing when you were sunburned? **Mark all that apply.**

- Working at your job
- Working outside at your home or family/friend's home
- Sunbathing
- Swimming
- Exercise (running, hiking, sports; do not include swimming)
- Watching a sporting event
- Attending an outdoor event or venue (a concert, the zoo, a fair, etc.)
- Day-to-day activities
- Other
- Don't remember

Health Information Trends Survey (HINTS5-Cycle3)

Sun Protective Behavior

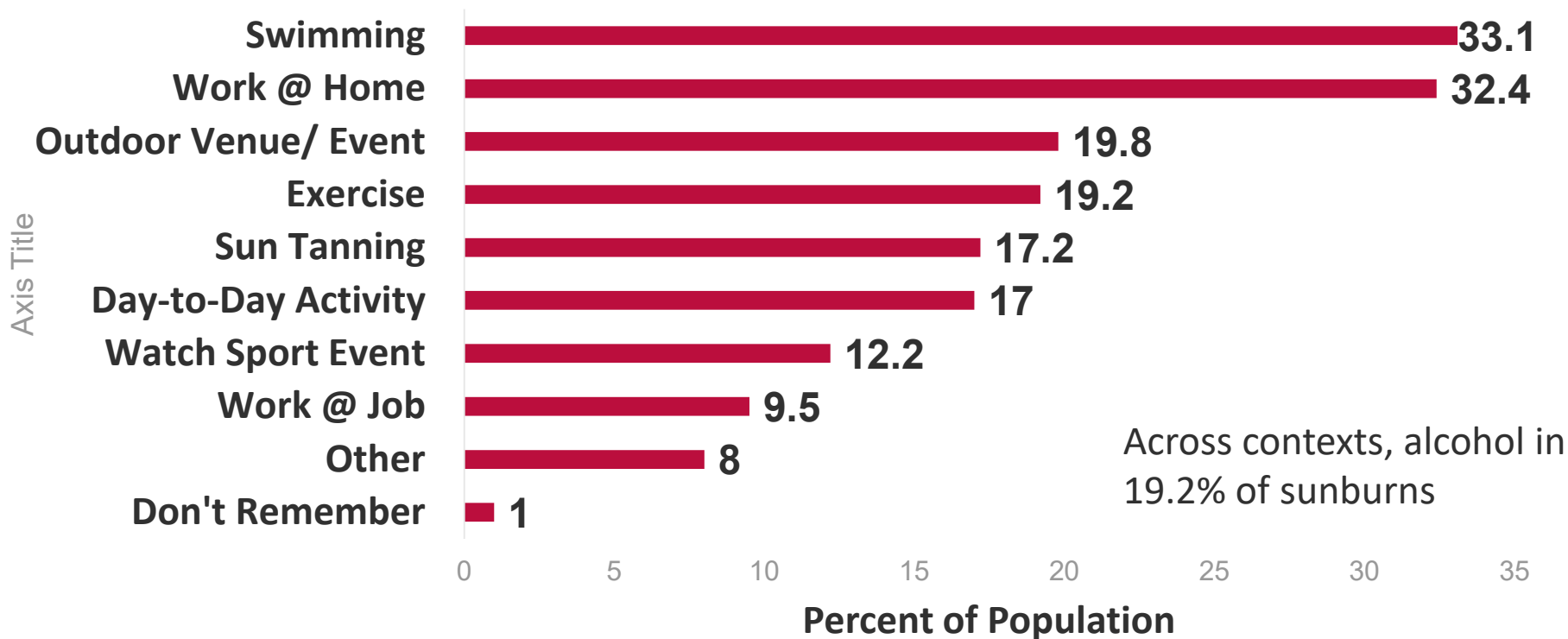
*The most recent time you got sunburned, were you doing any of the following things to protect yourself from the sun? **Mark all that apply.***

- Wearing sunscreen with an SPF of at least 15?
- Wearing protective clothing such as long pants or a shirt with sleeves that cover your shoulders
- Staying in the shade or under an umbrella
- None of the Above
- Don't remember

Were you drinking alcohol at any of the times when you were sunburned?

Response options: Yes, No, Don't Remember

Activity and Setting Context of the Most Recent Sunburn in last 12-months (N = 5,348 Adults HINTS5-Cycle3)*



*Contexts not mutually exclusive

Data Source: <https://hints.cancer.gov/data/download-data>

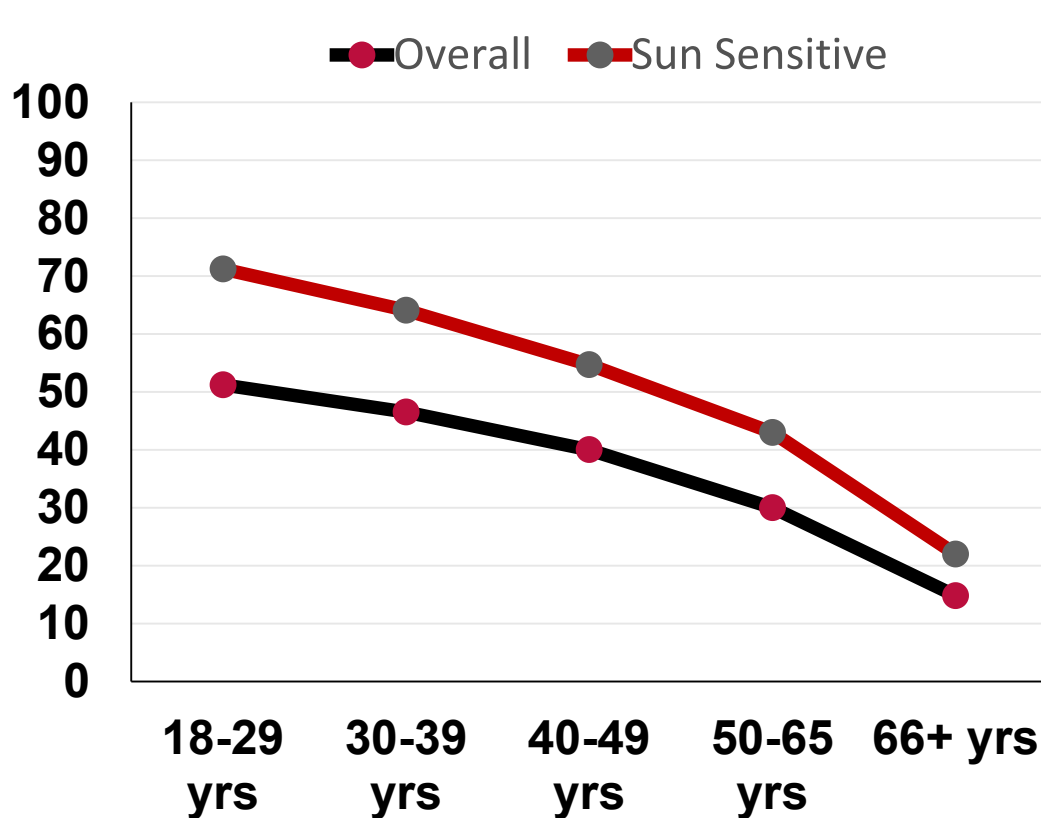
Sunburn Context	Sunscreen %	Multiple Behaviors* %	Clothing %	Shade/ Umbrella %	Other/Don't Remember %
Swimming	44.8	28.2	2.8	2.8	20.5
Work @ Home	25.3	22.2	11.8	3.1	37.2
Outdoor Venue	28.1	32.9	5.8	5.4	26.8
Exercise	29.4	26.9	6.3	2.1	34.6
Sun Tanning	47.1	23.0	1.2	2.3	25.2
Daily Activity	19.3	33.5	9.8	3.5	33.5
Watch Sport Event	30.2	30.2	5.5	5.5	27.5
Work @ Job	16.3	31.2	12.8	7.1	32.6
Other	24.4	32.8	9.2	6.7	36.8

**Sunscreen included in > 90%
of multiple behavior list*

Data Source: <https://hints.cancer.gov/data/download-data>.

Sun Protection and Sunburn in Context of Physical Activity?

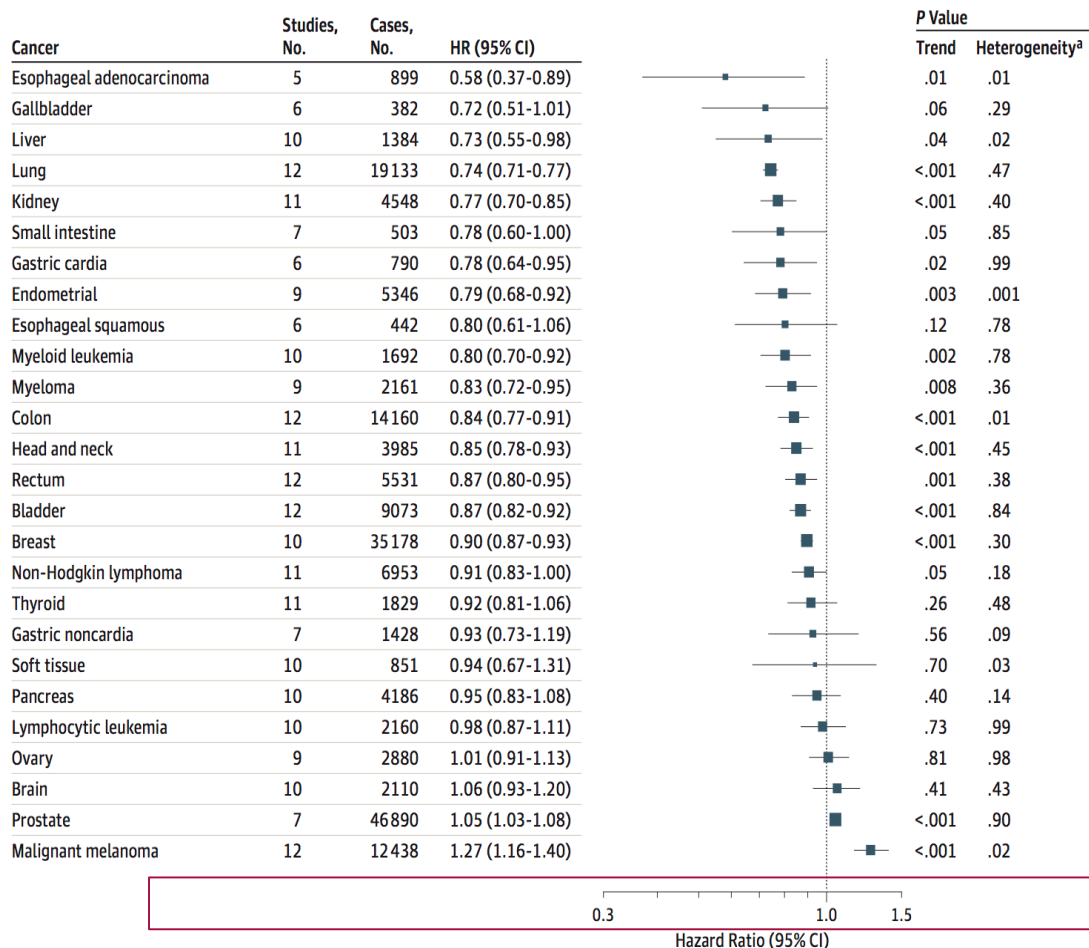
U.S. adults ≥ 1 sunburn in past year, by age group and sun sensitivity: National Health Interview Survey, 2015



Sunburn Associated with

- Age- younger (↑)
- Skin sensitivity & Race (↑)
- Married (↑)
- Live in sunny region (↑)
- Sunscreen Use** (↑)
- Overweight/obese (↑)
- Born/Live in US >10yrs (↑)
- Sunless tanning use (↑)
- Physical activity** (↑)
- Alcohol-binge 30days (↑)

Association of Leisure-time Physical Activity with Cancer Risk



Example Questions: Sun Protection and Sunburn in Context

How common is engaging in physical activity a context for sunburn?

Are the people specifically reporting sunburn in the physical activity context generally more physically active or are they less active (and perhaps less prepared)?

Do individuals who report sunburn in the physical activity context, differ in their sun-protection strategy than in other contexts?

Is the association between sunburn and physical activity level moderated by controlling for engagement in sun tanning

Context matters in understanding sunburn and use of sunscreen and other protective behaviors



Sunscreen Labeling, Recall, ingredient preference?

Assessment of the Usefulness and Recall of Active Ingredients on Sunscreen Labels by Consumers

Label information influencing sunscreen Selection	%
Ingredients	28%
Other Information	72%
Most important sunscreen label information	
SPF	72%
Other	17%
Ingredients	11%

N = 47

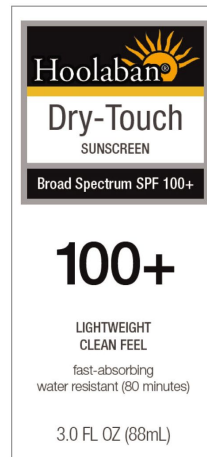
Source: JAMA Dermatol. 2021;157(5):573-576.

Characteristics of Participants Interviewed to Assess the Usefulness and Recall of Active Ingredients on Sunscreen Labels by Consumers

Label information recall?	%
Looked for active ingredients	21%
Recall any active ingredients	11%
Reasons for viewing Label?	%
Avoid ingredients perceived as harmful	11%
Product Comparison	4%
(Seek environmentally safe ingredients, Avoid allergens, Don't know)	2% each

N = 47

A Current



Drug Facts	
Active ingredients	Purpose
Avobenzene 3%, Homosalate 15%, Octisalate 5%, Octocrylene 4.5%, Oxybenzone 6%	Sunscreen
Uses • Helps prevent sunburn • If used as directed with other sun protection measures (see Directions), decreases the risk of skin cancer and early skin aging caused by sun damage	
Warnings For external use only • Do not use on damaged or broken skin • When using this product, keep out of eyes. Rinse with water to remove • Stop use and ask a doctor if rash occurs • Keep out of reach of children. If swallowed, get medical help or contact a Poison Control Center right away.	
Directions • Apply liberally 15 minutes before sun exposure • Reapply after 80 minutes of swimming or sweating, immediately after towel drying, at least every 2 hours • Sun Protection Measures: Spending time in the sun increases your risk of skin cancer and early skin aging. To decrease this risk, regularly use a sunscreen with a Broad Spectrum SPF value of 15 or higher and other sun protection measures, including limiting time in the sun, especially from 10 a.m. to 2 p.m., wearing long-sleeved shirts, pants, hats, and sunglasses • Children under 6 months: Ask a doctor	
Other information • Protect this product from excessive heat and direct sun • Protect from freezing • May stain some fabrics	
Inactive ingredients water, butylparaben, calcium, silica, titanium dioxide, copolymer, ethylhexyl triazone, glyceryl stearate, PEG-100, stearyl alcohol, C12-13 alkyl methacrylate copolymer, methacrylamide, cyclopentasiloxane, caprylate/C12-12, alkyl methacrylate copolymer, acrylate/methacrylate copolymer, triphenyltin triazone, diethylhexyl 2,6-naphthylate, disodium glycerate, disodium EDTA, BHT, methylmethacrylate	
Questions? Visit www.hoolaban.com or call 800-298-4786	

B Proposed



Drug Facts	
Active ingredients	Purpose
Avobenzene 3%, Homosalate 15%, Octisalate 5%, Octocrylene 4.5%, Oxybenzone 6%	Sunscreen
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Warnings For external use only • Do not use on damaged or broken skin • When using this product, keep out of eyes. Rinse with water to remove • Stop use and ask a doctor if rash occurs • Keep out of reach of children. If swallowed, get medical help or contact a Poison Control Center right away.	
Directions • Apply liberally and reapply 15 minutes before sun exposure • Reapply after 40 minutes of swimming or sweating, immediately after towel drying, at least every 2 hours • Sun Protection Measures: Spending time in the sun increases your risk of skin cancer and early skin aging. To decrease this risk, regularly use a sunscreen with a Broad Spectrum SPF value of 15 or higher and other sun protection measures, including limiting time in the sun, especially from 10 a.m. to 2 p.m., wearing long-sleeved shirts, pants, hats, and sunglasses • Children under 6 months: Ask a doctor	
Other information • Protect this product from excessive heat and direct sun • Protect from freezing • May stain some fabrics	
Ingredients water, butylparaben, calcium, silica, titanium dioxide, copolymer, ethylhexyl triazone, glyceryl stearate, PEG-100, stearyl alcohol, C12-13 alkyl methacrylate copolymer, methacrylamide, cyclopentasiloxane, caprylate/C12-12, alkyl methacrylate copolymer, acrylate/methacrylate copolymer, triphenyltin triazone, diethylhexyl 2,6-naphthylate, disodium glycerate, disodium EDTA, BHT, methylmethacrylate	
Questions? Visit www.hoolaban.com or call 800-298-4786	

Source: JAMA Dermatol. 2021;157(5):573-576. 20

Summary

- Linking sunscreen behavior to exposure/sunburn outcomes is critical
- Sunscreen is a complex behavior requiring:
 - Proper application
 - Understanding of labeling and risk reduction conferred by use (e.g., SPF interpretation)
 - Appreciation that use may differ by activity/setting context
- Search and recall of sunscreen ingredient labeling information occurs with low frequency
 - Further research needed to determine if ingredients impact sunscreen avoidance or improper application



Thank You!

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