The effect of an ultraviolet photography educational exercise on sunscreen application: A pilot study

To the Editor: Sun exposure is a risk factor for skin cancer development,[1] with most skin cancers preventable with sun protection. Sunscreen sun protection factor is based on an application of 2 mg/cm^2 of facial surface area as suggested by the Food and Drug Administration[2]; however, studies demonstrate that people apply less than 50% of the volume needed to achieve the intended sun protection factor, thus overestimating their sun protection.[3] Sunscreen application can be visualized with UV photography (UVP), which is easily performed by placing an inexpensive UV filter over a digital camera lens. Under UV light, chemical and physical sunscreen appear metallic black and blue, respectively (Fig 1). Although UVP has been utilized in dermatology as a sun damage education tool, it has not been used for sunscreen application education.[1,4] We sought to determine if visualizing application with UVP increases the amount of sunscreen applied, and to investigate the effects of demographic factors and sunscreen type (physical and chemical) on the results of the intervention.

Healthy volunteers were recruited from June to August 2022 and participants were randomized to apply either physical sunscreen for round 1 and chemical for round 2 or vice versa. Using a mirror, subjects applied sunscreen as they normally would. Subjects were then shown a UV photo of themselves with sunscreen. With a clean face, the process was repeated with the other sunscreen type (physical or chemical), such that each subject applied both types by the end of the study (round 2). Sunscreen bottles were weighed before and after applications to calculate the volume of sunscreen applied. Statistics were performed in RStudio version 1.4.1717.

A total of 30 subjects (ages 18-88, Fitzpatrick skin type I-V) were enrolled. A greater percentage of participants applied >2 mg/cm^2 during round 2 (postintervention) than in round 1 (36% vs 23%). The median application volume significantly increased from round 1 to round 2 (mean, 1.46; SD = 0.936-2.15; SD = 1.91; P = .023) (Fig 2). Subjects in the "chemical-first" group applied a greater amount from round 1 to round 2 (1.29; SD = 0.92-1.50; SD = 0.81; P = .0001); however, this was not true in the "physical-first" group (1.63; SD = 0.95-2.80; SD = 2.44; P = .45). The mean amount of sunscreen applied did not significantly differ between physical and chemical in round 1 (1.63 and 1.29, respectively, P = .19). No significant differences were observed in sunscreen application across self-reported race, gender, skin type, or age.

Fig 1. A split-face demonstration of chemical and physical sunscreen appearance under UV light. Chemical sunscreen is visualized as *metallic black* under UV light, whereas physical sunscreen appears *blue* under UV light. In this figure, both sunscreen types are shown; however in the study, sunscreen was applied to the whole face and cleansed between rounds.

The increase in application volume during round 2 suggests that UVP may be an effective intervention to increase volume of sunscreen application based on this pilot study. Although measuring sunscreen volume daily is impractical, UVP visualization may offer a feasible alternative. Emphasizing patient education on sunscreen application is of paramount importance in dermatology practice, as it fosters adherence to proper sun protection measures, reduces the risk of skin cancer, and ultimately contributes to better patient outcomes. Differences between chemical-first and physical-first groups indicate the intervention may be more suited to teach the application of chemical sunscreen, which appears darker on UVP. The lack of difference between sunscreen types in round 1 suggests there was negligible preintervention bias in application behaviors. Consistent changes across demographic groups highlight the broad applicability of this intervention. The findings presented here suggest that future studies with a larger sample size may further reveal the utility and limitations of UVP. Overall, most subjects applied less than the recommended amount of sunscreen in both rounds, suggesting that

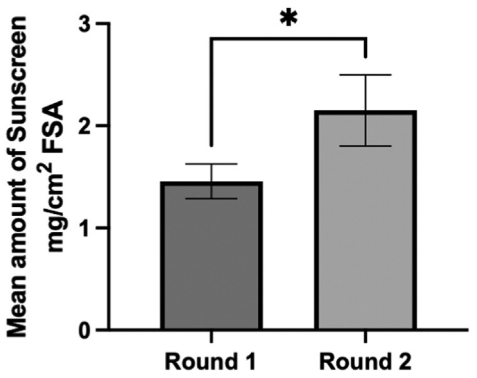

Fig 2. The mean amount of sunscreen and SE, measured in mg/cm^2 of the subjects' facial surface area, significantly increased from round 1 to round 2, controlling for sunscreen type (chemical and physical) (n = 30, P = .023). *FSA*, Facial surface area. *P <.05.

additional counseling is necessary to ensure proper sunscreen application among the public.

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Patient consent: Photographed individuals pictured in Fig 1 are staged for demonstration purposes only and therefore do not contain study participants. Consent for the publication of recognizable patient photographs or other identifiable material was obtained by the authors and included at the time of article submission to the journal stating that all patients gave consent with the understanding that this information may be publicly available.

Key words: skin cancer; sunscreen; ultraviolet photography; UV photography.

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Conflicts of interest

None disclosed.

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