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ABSTRACT

Background: The ability of novices to perform imaging of skin lesions is not well studied.

Objectives: To determine the ability of 12th grade high school students without formal training to take clinical and dermatoscopic images of skin lesions on patient-actors.

Patients/Methods: Nineteen participants were divided into 11 gender-specific groups of 1-2 students. Groups were provided written instructions and assessed in their ability to (a) identify 8 pre-specified skin lesions, (b) take overview clinical images, and (c) take contact, polarized dermatoscopic images. Groups captured the same images twice using two different cameras [Nikon™ 1 J1 / VEOS HD1 and a VEOS DS3 (Canfield Scientific, Inc.)]. The sequence of camera use was determined using block randomization. If students made visibly poor skin contact during dermatoscopic imaging using their first camera, study investigators provided verbal instructions to place the second camera directly onto the skin. Students completed anonymous surveys before and after the imaging activity.

Results: Students were proficient at identifying the correct pre-specified skin lesions (86/88, 98%), capturing sufficient quality overview clinical images of the back and legs (41/42, 98%), and taking dermatoscopic images of the entire skin lesion (174/176, 99%). Regarding dermatoscopic image quality, 116 of 175 (66%) images were in focus. Out of focus images were attributed to poor skin contact. Groups that received feedback (n=4) were able to obtain a significantly higher proportion of in focus dermatoscopic images using their second camera compared to their first camera (16% to 72%, $P<0.001$).

Conclusions: We identified several barriers that exist for participant-acquired dermatoscopic imaging. Instructions emphasizing the importance of skin contact are useful. Our results may help guide future patient-acquired teledermatoscopy efforts.

Introduction

The incidence of melanoma continues to increase in many countries [1-3]. Dermatoscopy has been shown to significantly improve the diagnostic accuracy of physicians for primary cutaneous melanoma [4,5]. Patient-acquired dermatoscopy has been suggested as a possible means to improve the ability of patients to detect melanoma during skin self-examination (SSE) [6]. A majority of melanomas are self-detected and laypersons' sensitivity for melanoma detection has been found to be higher with dermatoscopic images than with clinical photographs [7,8]. More recently, patient-acquired teledermatoscopy has been studied among adult patients at high risk for melanoma as a means to improve and complement SSE [9]. In two pilot studies, Janda et al found that patient-acquired teledermatoscopy is a feasible and potentially useful clinical tool but that significant barriers exist [9,10]. Of note, these studies were limited to highly motivated adults and did not directly monitor or assess participants performing dermatoscopic imaging in a supervised setting, precluding the identification of the technical challenges encountered during the imaging process as well as the contributing factors leading to poorer quality images.

As part of an ongoing longitudinal study of individual nevi in children and adolescents, we have serially imaged participants during middle and high schools with clinical and dermatoscopic imaging [11-19]. Our observations have documented the relative stability of nevus dermatoscopic patterns during early adolescence and have preliminarily identified differences in the anatomic site distribution and size changes among dermatoscopically defined nevus subsets [11,20,21]. We plan to validate our findings into early adulthood by continuing to prospectively monitor individual nevi after high school graduation via participant-acquired dermatoscopic imaging. To accomplish this aim, we will ship an imaging packet to study participants containing explicit instructions for acquiring overview clinical and dermatoscopic images along with a camera. With the assistance of a person of their choice, participants will be asked to take clinical and dermatoscopic images of specific skin lesions on their backs and legs and upload them to a study website.

To plan our methods and identify potential technical and logistical barriers for dermatoscopic imaging, we performed a small pilot study using current participants that included direct observation by study investigators of participant-acquired dermatoscopic imaging. Our rationale included applicability to patient-acquired teledermatoscopy efforts through identification of some of the intrinsic difficulties that may exist for novices performing dermatoscopic imaging, as well as measuring receptivity to this evolving imaging technology. In this study, our primary objective was to determine the ability of 12th grade high school students to capture overview clinical and dermatoscopic images of specific skin lesions on patient-actors without prior formal instruction or demonstration.

Methods

Study Overview

Institutional Review Board approval for this study was obtained from the Harvard School of Public Health in accordance with the Helsinki Declaration. Participants were 12th grade high school students, recruited from the SONIC graduating class of 2014 (n=130) at Framingham High School, who previously underwent clinical and dermatoscopic imaging of back and leg nevi while in the 8th and 11th grades. Students from this class were recruited through e-mail correspondence or personal contact by a study nurse (M.B.). Students and/or parents provided written informed consent and/or assent for participation. A monetary incentive was offered to students upon study completion. The study was conducted in April 2014. Sample size was determined based on logistical constraints of time required to perform the pilot intervention. The imaging had to be completed during one school day, within the confines of the participants' non-academic time and the limited physical space available for the study.

Procedures

In advance of the study, students were informed that they would be taking photographs of skin lesions on patient-actors but received no specific details regarding the types of images or the specific cameras to be used. A study investigator (M.M.) provided a 5-minute introduction at the beginning of each imaging activity that explained the purpose and overview of the study but included no imaging or camera instructions or demonstrations. Participants completed a pre-imaging survey and data were obtained on receptivity, confidence, and ability as they related to the imaging process, before being divided into gender-specific groups of 2 students (Supplementary Materials). If scheduled participants were unavailable to take part on the day of the study, groups of 1 student were created as scheduling constraints permitted.

Each group was assigned a gender-matched patient-actor. One male and one female patient-actor, ages 33 and 28 years respectively, were used in the study. Both the male and female patient-actors had 18 or more skin lesions on the back and 5 or more skin lesions on the anterior legs (male) or posterior legs (female). The baseline overview back and leg images of the patient-actors were taken the week of the study and annotated with both arrows and number- and color-coded icons to mark specific skin lesions. The clinical diagnoses of skin lesions used included 7 melanocytic nevi and 1 lentigo on the male and 7 melanocytic nevi and 1 dermatofibroma on the female. A range of dermatoscopic patterns (e.g., globular, reticular, homogenous, and multicomponent) was present in the nevi.

Explicit written instructions, annotated baseline overview photographs (both color print and digital formats, permitting zoom-in) of the patient-actors' backs and legs, number- and color-coded stickers, and two sets of cameras were provided to each group. Camera A was the VEOS DS3 (Canfield Scientific, Inc., Fairfield, NJ, USA), which is a handheld camera integrated within an iPod Touch (Apple Inc.) that permits both clinical and dermatoscopic imaging. Camera B was a customized Nikon™ 1 J1 with fixed-focus, and a magnetically attached VEOS HD1 (Canfield Scientific, Inc.). Camera order was randomized for each group using block randomization procedures and students were allowed a maximum of 35 minutes to complete the imaging activity.

Written instructions prompted students to identify prespecified skin lesions on the back (n=5) and legs (n=3) of the patient-actor using the annotated baseline overview back and leg images as a reference. Upon lesion identification, students placed the corresponding number- and color-coded sticker immediately adjacent to the lesion on the patient-actor's skin. Then, groups were instructed to use their first camera to take overview (n=2) and dermatoscopic images (n=8). Instructions explained that overview images should match the baseline overview images and include all skin lesions marked with stickers. Students were next instructed to take contact, polarized dermatoscopic images of all skin lesions they had marked with stickers. Students were informed not to delete any photos and to take as many photos as needed. Before capturing each dermatoscopic image, students were asked to gently wipe skin lesions with 70% isopropyl alcohol swabs. If after finishing use of the first camera, groups were noted to make visibly poor or no skin contact during dermatoscopic imaging, study staff verbally informed students of the need to place the camera firmly onto the skin. Instructions informed groups to repeat all imaging with their second camera. All skin lesions were small enough to be captured within the field of view of a single dermatoscopic image. At completion, students completed a post-imaging survey (Supplementary Materials). Survey responses for both the pre-imaging and post-imaging surveys were anonymous.

Imaging and Image Assessment

Time was recorded for each group for the following components: (*a*) nevus identification / sticker placement—defined as pick-up of stickers until placement of last sticker, (*b*) camera 1 use—defined as pick-up of first camera until put-down of first camera, (*c*) camera 2 use—defined as pick-up of second camera until put-down of second camera, and (*d*) total duration—defined as start of imaging activity to put-down of camera 2. During the imaging session, study staff recorded the ability of each group to correctly identify and mark prespecified skin lesions with stickers and to wipe each skin lesion with a 70% isopropyl alcohol swab immediately prior to dermatoscopic imaging. The application of 70% isopropyl alcohol prior to dermatoscopic imaging was recommended to optimize image quality [22].

Image quality was assessed by two study investigators (M.M. and M.F.). Overview images were assessed for focus (yes, no) and quality (sufficient, insufficient). Overview images were rated in focus if no blurriness was present in the image and of sufficient quality if they permitted accurate identification of the skin lesions marked with stickers for dermatoscopic imaging. Dermatoscopic images were assessed for: (*a*) presence of the sticker (yes, no), (*b*) inclusion of the entire skin lesion (yes, no), and (*c*) focus (yes, no). A dermatoscopic image was considered in focus if there was no blurriness of the skin lesion, permitting the accurate identification of colors, structures, and patterns present in the skin lesion. If multiple overview or dermatoscopic images were taken of the same anatomic site or skin lesion, analysis was restricted to the best image as determined by the study investigators.

Statistical Analysis

Descriptive statistics was used to assess the study variables. Fisher's exact test and McNemar's Chi-square were used for comparisons of categorical data. All tests were two-sided and a P value $<.05$ was considered statistically significant.

Results

Participants

Twenty-four high school seniors (12 males, 12 females) consented for the study but 5 were ineligible to participate [exam (n=1), field trip (n=1), absent (n=3)]. Nineteen participants (9 males, 10 females; mean age (SD) 18.1 (± 0.29) years) completed the study and were divided into 11 groups (8 groups of 2 participants and 3 groups of 1 participant).

Imaging Activity

Groups required a mean of 15 minutes 10 seconds to complete the imaging activity. Participants were able to correctly identify preselected lesions on the patient-actors 86 out of 88 times (98%) (8 lesions per 11 groups). Participants were successful in taking overview clinical images of sufficient quality (41/42, 98%), wiping lesions with isopropyl alcohol swabs before dermatoscopy (160/176, 91%), and capturing dermatoscopic images that included the sticker (174/176, 99%) and the entire lesion (174/176, 99%) (Table 1). Regarding dermatoscopic image quality, 116 of 176 (66%) images were in focus. A higher percentage of back images were in focus than leg images, although the difference was not statistically significant (70% v. 59%, $P = 0.144$).

Based on direct observation, 4 of the 11 groups made poor or no skin contact during dermatoscopic imaging with their first camera. For these groups, study staff verbally informed

TABLE 1. Imaging activity results. (Copyright: ©2015 Marchetti et al.)

Imaging Variables	Overall (n=11)	VEOS†	Nikon°	Camera Order 1 (n=6)		Camera Order 2 (n=5)	
				VEOS† first	Nikon° second	Nikon° first	VEOS† second
Total duration	15:10	—	—	—	—	—	—
Lesion identification and sticker placement	2:26	—	—	2:33		2:19	
Imaging	6:16	6:54	5:37	7:39	5:37	5:36	6:01
Overview clinical images*							
In focus	35/42 (83%)	16/22 (73%)	19/20 (86%)	8/12 (67%)	9/10 (90%)	10/10 (100%)	8/10 (80%)
Back	18/21 (82%)	8/11 (73%)	10/10 (91%)	4/6 (67%)	5/5 (83%)	5/5 (100%)	4/5 (80%)
Legs	17/21 (77%)	8/11 (73%)	9/10 (82%)	4/6 (67%)	4/5 (67%)	5/5 (100%)	4/5 (80%)
Sufficient quality	41/42 (98%)	21/22 (95%)	20/20 (100%)	11/12 (92%)	10/10 (100%)	10/10 (100%)	10/10 (100%)
Back	20/21 (95%)	10/11 (90%)	10/10 (100%)	5/6 (83%)	5/5 (100%)	5/5 (100%)	5/5 (100%)
Legs	21/21 (100%)	11/11 (100%)	10/10 (100%)	6/6 (100%)	5/5 (100%)	5/5 (100%)	5/5 (100%)
Dermatoscopic images							
Sticker visible	174/176 (99%)	—	—	—	—	—	—
Entire nevus present	174/176 (99%)	—	—	—	—	—	—
Nevus in focus							
All nevi	116/176 (66%)	46/88 (52%)	70/88 (80%)	20/48 (42%)	37/48 (77%)	33/40 (83%)	26/40 (65%)
Back nevi	77/110 (70%)	30/55 (55%)	47/55 (85%)	11/30 (37%)	25/30 (83%)	22/25 (88%)	19/25 (76%)
Leg nevi	39/66 (59%)	16/33 (48%)	23/33 (70%)	9/18 (50%)	12/18 (67%)	11/15 (73%)	7/15 (47%)

† VEOS DS3 (Canfield Scientific, Inc.)

° Nikon TM 1 J1 and VEOS HD1 (Canfield Scientific, Inc.)

*Two overview images were not taken by 1 group.

participants to firmly place the camera onto the skin before using their second camera. Four of the 6 groups that started with the VEOS DS3, but none of the groups that started with the Nikon ™ 1 J1 / VEOS HD1, required assistance. The 4 groups that received verbal feedback performed significantly better in obtaining in-focus dermatoscopic images with use of their second camera compared to their first camera (72% v. 16%, respectively, $P < 0.001$).

Groups not requiring help captured a significantly higher percentage of in focus dermatoscopic images than groups receiving assistance (79% v. 44%, $P < 0.001$). Among groups not requiring help, a non-statistically significant higher percentage of back and leg images were in focus using the Nikon ™ 1 J1 / VEOS HD1 than the VEOS DS3 (82% v. 73%, $P = 0.364$).

Survey Data—Participant Receptivity, Confidence, and Ability

Overall, a majority of students (15/19, 79%) rated the imaging activity as either "*Very easy*" or "*Easy*" (Table 2). No significant differences were observed between camera types for difficulty of use with 84% of participants rating both the Nikon ™ 1 J1 and the VEOS HD1 "*Very easy*" or "*Easy*" to use ($P = 1.0$). Participants reported high levels of comfort and confidence in finding and having a person of their choice take dermatoscopic images of their moles in both pre- and post-imaging surveys. The percentage of "*Very comfortable*" students increased from 42% in the pre-imaging survey to 68% in the post-imaging survey ($P = 0.06$). Complete survey data is provided in the Supplementary Materials (see pages 19-28).

Discussion

We found that 12th grade high school students are capable of capturing sufficient quality clinical and dermatoscopic images of specific skin lesions without formal training. Participants also reported feeling comfortable and confident with taking dermatoscopic images of their skin lesions. As participants will not be able to capture images of lesions on all body sites (e.g., back), it is important to note that they identified mul-

TABLE 2. Participant reported receptivity, confidence, and ability related to imaging process

	No./Total No. (%)	
	Pre-Imaging Survey (n=19)	Post-Imaging Survey (n=19)
Today, how comfortable are you having a person of your choice take photos of moles on your back and legs?		
Very comfortable	8 (42%)	13 (68%)
Comfortable	9 (47%)	4 (21%)
Neither comfortable nor uncomfortable	2 (11%)	1 (5%)
Uncomfortable	0	0
Very uncomfortable	0	0
No response	0	1 (5%)
Today, how confident are you, with the aid of a person of your choice, in your ability to take photos of moles on your back and legs using a provided camera?		
Very confident	11 (58%)	12 (63%)
Confident	6 (32%)	6 (32%)
Neither confident nor unconfident	2 (11%)	0
Unconfident	0	0
Very unconfident	0	0
No response	0	1 (5%)
Answer the following questions as if it is 3 years from today.		
How **confident** are you in your ability to find a person of your choice to help you take photos of moles on your back and legs?		
Very confident	13 (68%)	11 (58%)
Confident	6 (32%)	8 (42%)
Neither confident nor unconfident	0	0
Unconfident	0	0
Very unconfident	0	0
Who would you ask to help you take photos of the moles on your back and legs 3 years from today? (Select all that apply)		
Parent	17 (89%)	16 (84%)
Sibling	12 (63%)	12 (63%)
Another family member	9 (47%)	9 (47%)
Boyfriend/girlfriend	12 (63%)	12 (63%)
Friend	19 (100%)	19 (100%)
Not sure	0	0
Other:_____	0	0
Don't think I can find somebody to help take photos	0	0
The following questions relate to today's imaging session.		
In general, how **difficult** did you find today's imaging session?		
Very easy	—-	6 (32%)
Easy	—-	9 (47%)

(continued next page)

TABLE 2. (continued from previous page)

	No./Total No. (%)	
	Pre-Imaging Survey (n=19)	Post-Imaging Survey (n=19)
Neither easy nor difficult	—-	4 (21%)
Difficult	—-	0
Very difficult	—-	0
How **easy** was it to use the VEOS DS3?		
Very easy	—-	9 (47%)
Easy	—-	7 (37%)
Neither easy nor difficult	—-	2 (11%)
Difficult	—-	1 (5%)
Very difficult	—-	0
How **easy** was it to use the Nikon TM 1 J1 / VEOS HD1?		
Very easy	—-	7 (37%)
Easy	—-	9 (47%)
Neither easy nor difficult	—-	3 (16%)
Difficult	—-	0
Very difficult	—-	0

Percentages may not add to 100% due to rounding.

tiple people with whom they would feel comfortable asking to help them with imaging. No students reported difficulty with the imaging activity.

Our data complements and builds upon a previous study performed by Janda et al that examined the feasibility of patient-acquired teledermatoscopy as a tool to enhance skin self-examinations [9]. Eight of the 10 participants in that study reported that taking dermatoscopic images was 'easy' and 88% (58/66) of dermatoscopic images were rated as 'good quality' by the study investigators. The contributing factors leading to poorer quality images were not reported, but were likely difficult to quantify as dermatoscopic imaging technique was not directly observed by study investigators. It is also important to note the differences in their study population, which was restricted to highly motivated adult patients with a personal or family history of melanoma, atypical moles, or multiple moles, limiting the generalizability of their results to other less-motivated patient populations. As the participants in our study are drawn from a population-based study sample, our results may be more representative of the general population.

The need to place cameras directly on the skin for contact, polarized dermatoscopic imaging was not always intuitive to participants. Although printed instructions informed students to place cameras directly onto skin lesions and included representative images demonstrating this particular step for each camera, we did not provide a live or recorded demonstration of dermatoscopic imaging. Four of 11 groups (36.4%) required feedback regarding dermatoscopic technique from study investigators. Importantly, after receiving verbal instructions, the dermatoscopic image quality of these students improved significantly, suggesting a rapid learning curve. A potential limitation of our printed instructions may have been the terminology used to refer to dermatoscopic imaging. We used the term "close-up images" for "dermatoscopic images." A more practical layperson term for "dermatoscopic images" may be "contact images" in situations when contact, polarized dermatoscopy is desired.

Future studies may benefit from instructions that emphasize the need for firm and flat contact of the camera surface with the skin. Despite no statistical difference in the percentage of in focus back and leg dermatoscopic images, we observed that students had more difficulty imaging leg lesions. We suggest that anatomic differences between the legs (cylindrical shape and location close to the ground) and back (flat and easy to access while standing) may have been contributing factors. Of note, all 4 groups that initially had difficulty with skin contact started with the VEOS DS3, although we found that the student responses for camera difficulty did not differ by camera type. The additional mass of the Nikon ™ 1 J1 / VEOS HD1 compared to the VEOS DS3 (0.57 kg v. 0.53 kg, respectively) may have unintentionally assisted users in achieving better skin contact. In the future, we plan to provide a short video with an explicit demonstration of the technique required for contact, polarized dermatoscopic imaging. We will also consider recommendations for lower

extremity lesions to be imaged with the subject lying down (e.g., on a bed) to facilitate skin contact.

As the participants of this pilot study originated from a larger skin imaging study and have previously, albeit briefly, been exposed to dermatoscopic imaging by professional photographers, our results may not be applicable to other populations. The number of anatomic sites imaged, diversity and size of skin lesions included, and modalities of dermatoscopic imaging examined were also restricted and limit the generalizability of our findings. Our results may not be representative of dermatoscopic imaging on acral, intertriginous, or hairy sites, as well as the face, scalp, and nails. Furthermore, our methodology did not include skin lesions of a size requiring multiple dermatoscopic images or with dermatoscopic structures that may be technically challenging to image, including blood vessels, vascular blush, and shiny white structures (e.g., crystalline, chrysalis, shiny white lines/areas/strands, and rosettes). We also did not assess other modalities of dermatoscopic imaging including non-contact, polarized dermatoscopy and contact, non-polarized dermatoscopy. Due to time, space, and logistical constraints, our sample size was limited, precluding a meaningful analysis or comparison between sample subgroups.

Patient-acquired dermatoscopy is expected to become more common with the commercial availability of inexpensive attachments that facilitate mobile phone dermatoscopic imaging. Certain patient populations, including high-risk melanoma patients, may find this technology useful when performing skin self-examinations and monitoring individual melanocytic nevi for change. Patient-acquired dermatoscopy may also be useful for physician-initiated sequential digital dermatoscopic imaging, allowing repeat follow-up images to be taken by patients and potentially eliminating the need for a return office visit. Clinical studies examining skin lesions over time may similarly benefit from participant-acquired dermatoscopic imaging by reducing study expenditures and the number of required protocol visits. Our preliminary study identified several barriers to participant-acquired dermatoscopic imaging. We believe that by modifying the imaging protocol based on the lessons learned herein, participant-acquired dermatoscopic imaging will become feasible for clinical and research purposes. In summary, we found that inadequate skin contact during contact, polarized dermatoscopic imaging, particularly on the lower extremities, was the most common contributing factor to out of focus images. Future studies of patient-acquired teledermatoscopy may benefit from the use of video instructions and recommendations for imaging to be performed with participants lying down.

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See pages 19-28 for supplementary materials.

Supplementary Materials

Pre-Survey

1. What is your gender?
   - ☐ Male
   - ☐ Female

2. Today, how **comfortable** are you having a person of your choice take photos of moles on your back and legs?
   - ☐ Very comfortable
   - ☐ Comfortable
   - ☐ Neither comfortable nor uncomfortable
   - ☐ Uncomfortable
   - ☐ Very uncomfortable

3. Today, how **confident** are you, with the aid of a person of your choice, in your ability to take photos of moles on your back and legs using a provided camera?
   - ☐ Very confident
   - ☐ Confident
   - ☐ Neither confident nor unconfident
   - ☐ Unconfident
   - ☐ Very unconfident

4. Today, how **comfortable** are you uploading photos of moles on your back and legs to a secure, password-protected website?
   - ☐ Very comfortable
   - ☐ Comfortable
   - ☐ Neither comfortable nor uncomfortable
   - ☐ Uncomfortable
   - ☐ Very uncomfortable

5. Today, how **confident** are you in your ability to upload photos of moles on your back and legs to a secure, password-protected website?
   - ☐ Very confident
   - ☐ Confident
   - ☐ Neither confident nor unconfident

☐ Unconfident

☐ Very unconfident

6. Today, how **confident** are you using internet-based technology (e.g., logging into websites, uploading photos)?

☐ Very confident

☐ Confident

☐ Neither confident nor unconfident

☐ Unconfident

☐ Very unconfident

ANSWER THE FOLLOWING QUESTIONS AS IF IT IS 3 YEARS FROM TODAY

7. How **confident** are you in your ability to find a person of your choice to help you take photos of moles on your back and legs?

☐ Very confident

☐ Confident

☐ Neither confident nor unconfident

☐ Unconfident

☐ Very unconfident

8. **Who** would you ask to help you take photos of the moles on your back and legs 3 years from today? (Select all that apply)

☐ Parent

☐ Sibling

☐ Another family member

☐ Boyfriend / girlfriend

☐ Friend

☐ Not sure

☐ Other: _____

☐ Don't think I can find someone to help take photos

Post-Survey

9. Today, how **comfortable** are you having a person of your choice take photos of moles on your back and legs?
    - ☐ Very comfortable
    - ☐ Comfortable
    - ☐ Neither comfortable nor uncomfortable
    - ☐ Uncomfortable
    - ☐ Very uncomfortable

10. Today, how **confident** are you, with the aid of a person of your choice, in your ability to take photos of moles on your back and legs using a provided camera?
    - ☐ Very confident
    - ☐ Confident
    - ☐ Neither confident nor unconfident
    - ☐ Unconfident
    - ☐ Very unconfident

11. Today, how **comfortable** are you uploading photos of moles on your back and legs to a secure, password-protected website?
    - ☐ Very comfortable
    - ☐ Comfortable
    - ☐ Neither comfortable nor uncomfortable
    - ☐ Uncomfortable
    - ☐ Very uncomfortable

12. Today, how **confident** are you in your ability to upload photos of moles on your back and legs to a secure, password-protected website?
    - ☐ Very confident
    - ☐ Confident
    - ☐ Neither confident nor unconfident
    - ☐ Unconfident
    - ☐ Very unconfident

13. In general, how **confident** are you using internet-based technology (e.g., logging into websites, uploading photos)?

☐ Very confident
☐ Confident
☐ Neither confident nor unconfident
☐ Unconfident
☐ Very unconfident

ANSWER THE FOLLOWING QUESTIONS AS IF IT IS 3 YEARS FROM TODAY

14. How **confident** are you in your ability to find a person of your choice to help you take photos of moles on your back and legs?

☐ Very confident
☐ Confident
☐ Neither confident nor unconfident
☐ Unconfident
☐ Very unconfident

15. **Who** would you ask to help you take photos of the moles on your back and legs 3 years from today? (Select all that apply)

☐ Parent
☐ Sibling
☐ Another family member
☐ Boyfriend / girlfriend
☐ Friend
☐ Not sure
☐ Other: _____
☐ Don't think I can find someone to help take photos

16. How **confident** are you that you can receive a package in the mail containing a camera 3 years after graduating high school?

☐ Very confident
☐ Confident
☐ Neither confident nor unconfident
☐ Unconfident

☐ Very unconfident

17. How **confident** are you that you can return the package with the camera in the mail after you finish using it?
    - ☐ Very confident
    - ☐ Confident
    - ☐ Neither confident nor unconfident
    - ☐ Unconfident
    - ☐ Very unconfident

18. Three years from now, how much money do you think would be a reasonable incentive for taking photos of your moles?
    - ☐ $20
    - ☐ $40
    - ☐ $60
    - ☐ $80
    - ☐ _____

THE FOLLOWING QUESTIONS RELATE TO TODAY'S IMAGING SESSION:

19. In general, how **difficult** did you find today's imaging session?
    - ☐ Very easy
    - ☐ Easy
    - ☐ Neither easy nor difficult
    - ☐ Difficult
    - ☐ Very difficult

20. If you had to choose between cameras, which would you **prefer**?

☐ 

☐ 

☐ No preference

21. Which camera did you use **first** today?

☐ 

☐ 

+ 

22. Which camera did you find **easier** to use?

☐ 

☐ 

+ 

☐ No difference

23. How **easy** was it to use the:

☐ Very easy
☐ Easy
☐ Neither easy nor difficult
☐ Difficult
☐ Very difficult

24. How **easy** was it to use the:

- ☐ Very easy
- ☐ Easy
- ☐ Neither easy nor difficu
- ☐ Difficult
- ☐ Very difficult

25. How **helpful** were the written instructions?

- ☐ Very helpful
- ☐ Helpful
- ☐ Neither helpful nor unhelpful
- ☐ Unhelpful
- ☐ Very unhelpful

26. If the written instructions were unhelpful, **which parts were not helpful**? You can select more than one choice.

- ☐ Stickers
- ☐ Taking overview images
- ☐ Taking close-up images
- ☐ Using cameras
- ☐ Other: _____
- ☐ N/A. The written instructions were helpful.

27. What was the most **challenging** aspect of today's imaging session?

- ☐ Finding the correct moles
- ☐ Placing stickers
- ☐ Taking overview images
- ☐ Taking close-up images
- ☐ Uploading photos
- ☐ Other: _____

Supplementary Survey Data

Responses to questions 2, 3, 7, 8, 9, 10, 19, 23, and 24 are provided in Table 2 of the manuscript.

Responses to all remaining questions are provided below.

Supplementary Table 1. Survey Responses.

	No./Total No. (%)	
Survey Question	**Pre-Imaging Survey**	**Post-Imaging Survey**
	(n=19)	**(n=19)**
What is your gender?		
Male	9 (47%)	9 (47%)
Female	10 (53%)	10 (53%)
Today, how **comfortable** are you uploading photos of moles on your back and legs to a secure, password-protected website?		
Very comfortable	16 (84%)	16 (84%)
Comfortable	3 (16%)	2 (11%)
Neither comfortable nor uncomfortable	0	0
Uncomfortable	0	0
Very uncomfortable	0	0
No response	0	1 (5%)
Today, how **confident** are you in your ability to upload photos of moles on your back and legs to a secure, password-protected website?		
Very confident	11 (58%)	14 (74%)
Confident	8 (42%)	4 (21%)
Neither confident nor unconfident	0	0
Unconfident	0	0
Very unconfident	0	0
No response	0	1 (5%)
In general, how **confident** are you using internet-based technology (e.g., logging into websites, uploading photos)?		
Very confident	12 (63%)	14 (74%)
Confident	6 (32%)	5 (26%)
Neither confident nor unconfident	1 (5%)	0
Unconfident	0	0
Very unconfident	0	0
No response	0	0
Answer the following questions as if it is 3 years from today.		
How **confident** are you that you can receive a package in the mail containing a camera 3 years after graduating high school?		
Very confident	---	14 (74%)
Confident	---	5 (26%)
Neither confident nor unconfident	---	0

Unconfident	---	0
Very unconfident	---	0
No response	---	0
How **confident** are you that you can return the package with the camera in the mail after you finish using it?		
Very confident	---	16 (84%)
Confident	---	3 (16%)
Neither confident nor unconfident	---	0
Unconfident	---	0
Very unconfident	---	0
No response	---	0
Three years from now, how much money do you think would be a reasonable incentive for taking photos of your moles?		
$20	---	3 (16%)
$40	---	6 (32%)
$60	---	3 (16%)
$80	---	3 (16%)
Other: $50	---	1 (5%)
Other: $70	---	2 (11%)
Other: $150	---	1 (5%)
The following questions relate to today's imaging session.		
If you had to choose between cameras, which would you **prefer**?		
VEOS DS3	---	11 (58%)
Nikon ™ 1 J1 / VEOS HD1	---	3 (16%)
No preference	---	5 (26%)
Which camera did you use **first** today?		
VEOS DS3	---	9 (47%)
Nikon ™ 1 J1 / VEOS HD1	---	10 (53%)
Which camera did you find **easier** to use?		
VEOS DS3	---	11 (58%)
Nikon ™ 1 J1 / VEOS HD1	---	4 (21%)
No preference	---	4 (21%)
How **helpful** were the written instructions?		
Very helpful	---	12 (63%)
Helpful	---	7 (37%)
Neither helpful nor unhelpful	---	0
Unhelpful	---	0
Very unhelpful	---	0
No response	---	0
If the written instructions were unhelpful, **which parts were not helpful**? You can select more than one choice.		
Stickers	---	0
Taking overview images	---	0
Taking close-up images	---	0
Using cameras	---	1 (5%)
Other:	---	0
N/A. The written instructions were helpful.	---	18 (95%)
What was the most **challenging** aspect of today's imaging session?		
Finding the correct moles	---	4 (21%)
Placing stickers	---	0

Taking overview images	---	4 (21%)
Taking close-up images	---	10 (53%)
Uploading photos	---	0
Other: VEOS DS3 error message	---	1 (5%)
Percentages may not add to 100% due to rounding.		