

# Is beauty worth the risk? Self-confidence is the key motivating factor driving tanning bed use among undergraduate students at South Dakota universities

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## ABSTRACT

**Background:** Exposure to ultraviolet radiation is a leading risk factor for developing all types of skin cancer. In the United States, an estimated 7.8 million young adults engage in indoor tanning.

**Objective:** Here, it is hypothesized that certain populations of students at undergraduate universities, namely sorority members, have a greater frequency of tanning bed usage than other groups of students and that regardless of sorority status, the most important motivating factor will be the intent to enhance one's appearance.

**Methods:** Undergraduate students at 2 state-funded universities were recruited for participation in this institutional review board-exempt survey via distribution to e-mail addresses and social media accounts affiliated with student organizations/clubs.

**Results:** Among all respondents, the most common motivating factors for tanning bed use were the perception of improved self-appearance and boosted self-confidence. Female sorority members were more likely to use tanning beds and also more likely to report being motivated by enhanced appearance and self-confidence, than their female counterparts who were not sorority members.

**Limitations:** The sample size ( $n = 321$ ) and population of this study allows data to only be generalizable to surrounding states with similar demographics. The findings of this study are subject to recall bias as the data is self-reported.

**Conclusion:** Tanning bed use remains a popular practice among young people. Understanding motivations for tanning bed use among populations at increased risk of partaking in this behavior allows for educating these groups on the risks associated with ultraviolet radiation exposure. It is crucial that providers continue to promote skin health and take steps to dissuade detrimental practices and possible habit-forming behaviors at the individual and state levels.

**Keywords:** advocacy, epidemiology, melanoma, public health, skin cancer, survey, tanning beds, tanning, ultraviolet (UV) light

## Introduction

The most commonly diagnosed malignancies in the United States are skin cancers—reported numbers of which likely represent a fraction of the true disease burden—as nonmelanoma skin cancers (basal cell and squamous cell cancer) are not required to be reported to cancer registries.<sup>1</sup> The Centers for Disease Control and Prevention estimates that 1 in 5 Americans will develop skin cancer in their lifetime. Cutaneous melanoma accounts for approximately just 1% of cutaneous malignancy in the United

States, yet it accounts for almost all skin cancer deaths, due to a 5-year survival rate of 30% after metastasis.<sup>2</sup> It is estimated that approximately 1 million Americans are currently living with melanoma.<sup>1</sup> Occupational and recreational exposure to

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## What is known about this subject in regard to women and their families?

- Despite awareness of the dangers associated with tanning beds, young adult populations, especially young women, continue to use them.
- The most significant motivating factors for tanning bed use among young people, particularly young women, remain perception of enhanced appearance and improved self-confidence.

## What is new from this article as messages for women and their families?

- Indoor tanning can be habit-forming and thus needs to be addressed by primary care and dermatology providers through patient education and routine skin checks.
- Advocacy efforts at the legislative level should be aimed toward banning tanning bed use in minors, meanwhile, continued public health education to parents and families regarding the dangers of tanning bed use is imperative.

ultraviolet (UV) radiation is one of the most significant risk factors for developing all types of skin cancer and is largely preventable.<sup>3</sup> Other risk factors for developing skin cancer include light skin color, personal or family history, weakened immune system, the presence of more than 50 moles, and large, atypical moles.<sup>3</sup> Young adults and adolescents exposed to intense UV radiation are particularly at risk for developing skin cancer as severe sunburns early in life may increase the risk of melanoma.<sup>4</sup>

Melanoma rates in the United States have doubled in the period from 1982 to 2011, however, trends vary by age group. Under the age of 50, women have higher rates of melanoma than men, whereas after age 50 the reverse is true.<sup>1</sup> One factor that may contribute to the increased incidence of melanoma in young females is the greater use of indoor tanning as compared to males of the same age group. According to the American Academy of Dermatology Association, tanning indoors increases a woman's chance of developing melanoma by approximately 6-fold,<sup>5</sup> as well as increasing the risk of developing squamous cell and basal cell carcinomas by 58% and 24%, respectively.<sup>6</sup> Relatedly, 5 or more blistering sunburns between the ages of 15 and 20 increases nonmelanoma skin cancer risk by up to 68% and melanoma risk by up to approximately 80%.<sup>2</sup>

Encouraging trends show that the overall incidence of melanoma in younger age groups in the United States has declined in recent years.<sup>4</sup> As of 2020, North America had an incidence rate of 18 (males) and 14 (females) melanoma cases per 100,000 people.<sup>7</sup> For comparison, as of 2020, melanoma incidence per 100,000 people in Australia was 42 (males) and 31 (females), for Western Europe incidence was 19 for males and females, and incidence was less than 1 per 100,000 for both males and females in Asian countries, respectively.<sup>7</sup> This decline in melanoma incidence in younger age groups in the United States is likely due to several factors, one of which is the passing of regulations by the US Food and Drug Administration. In 2014, legislation in the United States passed regulations for the sale, marketing terms, and addition of warning labels for devices used for tanning purposes.<sup>8</sup> Additionally, the World Health Organization's International Agency of Research on Cancer declared UV

radiation from natural and artificial sources (ie, tanning beds) as a known carcinogen,<sup>9</sup> which contributed to many states in the United States banning the usage of tanning beds by minors under the age of 18, in an effort to prevent excessive UV exposure in young adults.<sup>10</sup> South Dakota does not prohibit minors under the age of 18 from using tanning beds.<sup>10</sup>

Despite legislation being passed in 2014 for regulations on devices used for tanning purposes, it is estimated that as of 2015 in the United States, 7.8 million young adults were still utilizing indoor tanning.<sup>11</sup> However, other countries have enforced more strict regulations such as Australia having completely banned tanning beds. No European country has enacted a total ban on tanning beds comparable to Australia. Although, many European countries have implemented tanning bed access restrictions for minors.<sup>10</sup> Importantly, in the United States, the prevalence of adults utilizing tanning beds dropped significantly in states that passed legislation prohibiting youth from indoor tanning, likely due to fewer minors carrying this practice forward into adulthood.<sup>12</sup> In states that did not pass legislation, adult prevalence of indoor tanning bed usage did not significantly decrease.<sup>12</sup> Because indoor tanning equipment emits both UVA and UVB radiation,<sup>6</sup> indoor tanning may pose a very real danger to the youth of South Dakota. Additionally, the use of tanning beds before age 20 is associated with a 47% increase in melanoma risk, and further increases occur with each subsequent use.<sup>6</sup>

In 2019, South Dakota had 26.5 newly diagnosed cases of melanoma per 100,000 people—greater than the national average of 22.9 per 100,000 people.<sup>13</sup> For comparison Slovenia, a country of similar latitude and socioeconomic makeup as South Dakota, had an incidence of 19.7 melanoma cases per 100,000 people in 2020.<sup>14</sup> In South Dakota, the incidence of melanoma has steadily increased over the past few decades and continues to climb (Fig. 1).<sup>13</sup> This steady increase is likely multifactorial and may arise from influences such as older age groups' lack of awareness of UV radiation exposure, motivations to tan, and youth access to indoor tanning. A few studies have shown that outdoor tanning, whether intentional or unintentional, is common among college students.<sup>15</sup> Regarding indoor tanning,

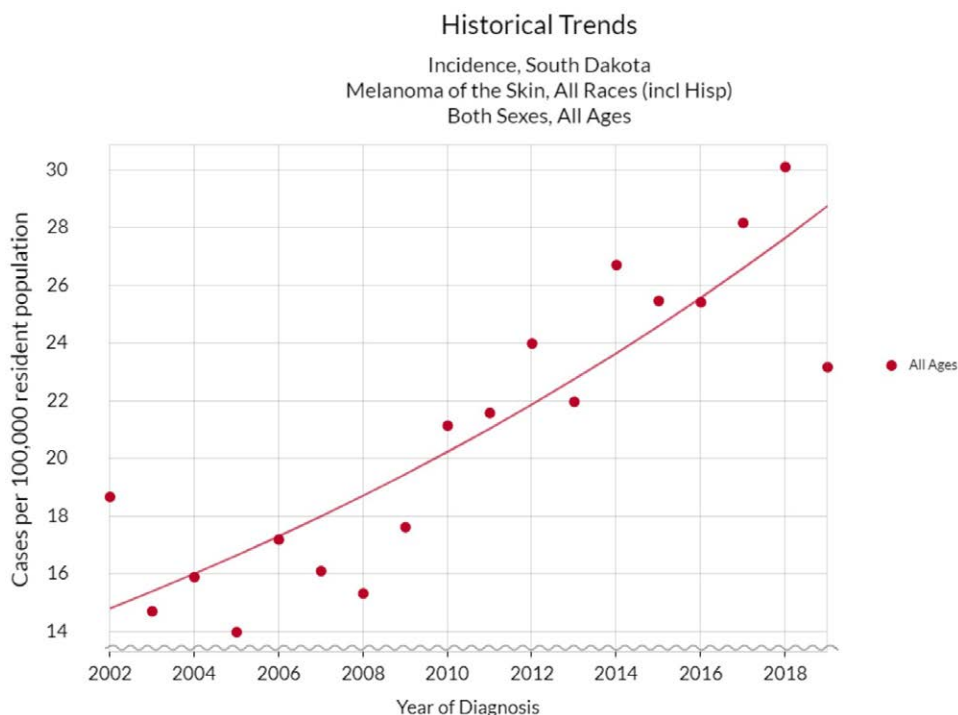


Fig. 1. Historical trends of the incidence of melanoma diagnosed in South Dakota. Source: Courtesy of National Cancer Institute (2019) reproduced with permission.

studies of US college students have identified motivations including, but not limited to: improving physical appearance and emotions, health perceptions (ie, vitamin D increase), and the influence of parents, peers, and the media.<sup>15</sup>

To our knowledge, there are no studies assessing tanning bed usage among undergraduate student populations in the Midwest or South Dakota specifically. The present study aims to identify tanning bed usage trends among the undergraduate student population of South Dakota, while also identifying factors and motivations influencing their use. We hypothesize that certain subsets—specifically, females participating in sororities—within the greater population of undergraduate university students, may have greater frequency of indoor tanning than non-sorority members, and that regardless of sorority status, the most important motivating factor will be the intent to enhance one's appearance.

## Methods

The present study aimed to better understand the attitudes, perceptions, and knowledge of skin health and gain insight into the tanning bed usage trends among undergraduate students at the 2 state-funded universities in South Dakota—the University of South Dakota (USD) and South Dakota State University—through a digital survey. Survey development included input from interviews of dermatologists and public health professionals affiliated with USD regarding survey items that would best capture information regarding skin health and tanning bed usage in the target population. A 29-question survey composed of closed and open-ended questions was developed (Supplementary Table S1, <http://links.lww.com/IJWD/A45>). Medical students, physicians, and professors affiliated with USD reviewed the survey for content and soundness. The survey was granted exemption from the USD Institutional Review Board.

Study participants were recruited through survey distribution to e-mail addresses affiliated with undergraduate student organizations/clubs and social media accounts of undergraduate student organizations/clubs. Inclusion criteria were undergraduate student status at USD or South Dakota State University and age 18+. Data collection occurred from August to December 2022; the Qualtrics database was used for both anonymous data collection and storage. Quantitative data was analyzed using descriptive statistics, while thematic analysis of qualitative data was performed. For descriptive statistics, a  $P < .05$  was considered significant. Thematic analysis allows one to look at patterns or trends among men and women or sorority and non-sorority groups who likely have different social norms.  $\chi^2$  analysis was used to identify differences between 2 categories (eg, sorority versus non-sorority members).

## Results

### Quantitative results

#### Demographics

For demographic characteristics of survey participants, see Table 1.

#### Tanning bed use

Over half (58.77%) of all respondents reported never having used a tanning bed in their lifetime, while another 20.1% indicated they only use tanning beds prior to special events (vacations, formals, weddings, etc), and another 5.2% ( $n = 16$ ) indicated that they presently use tanning beds regularly and have been doing so for at least 1 year (Fig. 2). About 56.84% of female sorority members reported the use of tanning beds at least once in their lives, while 34.27% of female non-sorority members reported at least one use of indoor tanning beds.

**Table 1**

### Demographic characteristics of survey participants

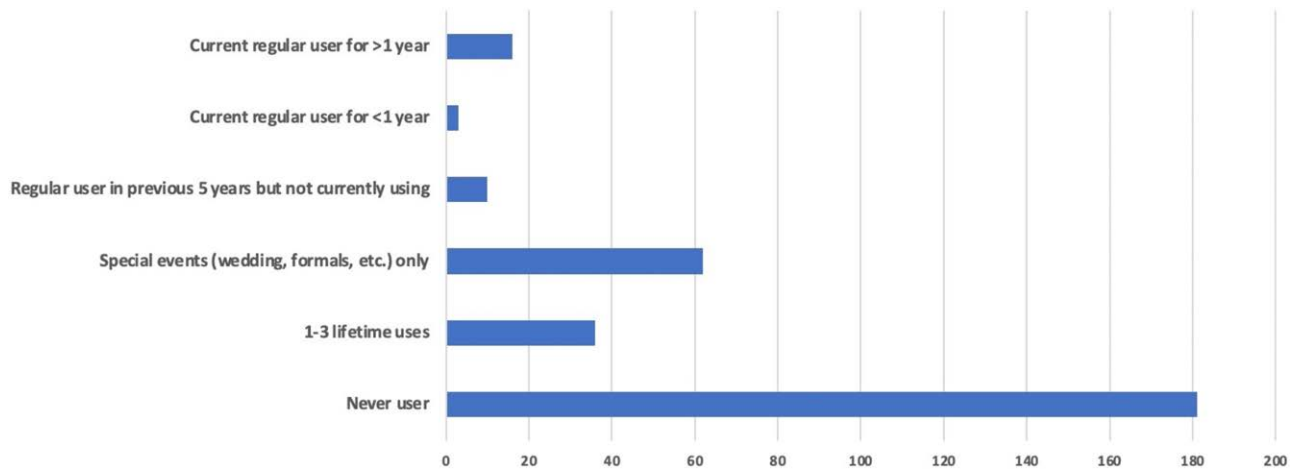
<i>n</i> = 321	
Age	
18	26%
19	21%
20	20%
21	17%
22	7%
Sex	
Male	16%
Female	80%
Other	4%
Self-identity	
American Indian/Native American	7%
Asian	3%
Black or African American	2%
White	86%
Hispanic or Latino	2%
Other	1%
Geographic background	
West	3.9%
Midwest	93.3%
Southeast	2.3%
Northeast	0.3%
Southwest	0.3%
Hometown classification	
Rural	58%
Urban	36%
Unsure	6%
College attending	
USD	82%
SDSU	18%
Year in school	
1 (freshman)	34%
2 (sophomore)	17%
3 (junior)	22%
4 (senior)	20%
5+	7%
Greek life membership	
Sorority	31%
Fraternity	7%
None	63%
Self-identified Fitzpatrick skin type	
I	22.83%
II	40.51%
III	29.58%
IV	5.79%
V	0.64%
VI	0.64%

SDSU, South Dakota State University; USD, University of South Dakota.

Females in sororities are significantly less likely to report never having used a tanning bed compared to females that are not in sororities (43.5% vs 57.4%,  $\chi^2 [1, N = 247] = 4.50$ ,  $P = .0340$ ).<sup>16</sup> Among all those who tan, 66.2% indicated they use tanning beds at a local facility or business (Year Round Brown, Tan City, etc) that has tanning beds, while 19.1% indicated that their gym or fitness center offers tanning beds for use by patrons. Approximately 44% of Midwestern white women aged 18–21 reported the use of tanning beds<sup>17</sup> as compared to 41.23% of all participants.

#### Motivations for tanning bed use

Study participants who use tanning beds cited self-confidence as the most common underlying motivation for their use. Among all those who tan, 89.28% agreed that they have more self-confidence when their skin is tan, while 92.94% agreed they think they look better with tan skin (Fig. 3). About



**Fig. 2.** Self-reported tanning bed usage among study participants with the X-axis being the number of participants and the Y-axis being the frequency of tanning bed use.

77.17% of those that use tanning beds stated that they tan to look better for special events (formals, weddings, etc). Those females in sororities are significantly more likely to agree they look better when their skin is tan (92.7% vs 82.3%,  $\chi^2 [2, N = 192] = 6.00, P = .0497$ )<sup>16</sup> and significantly more likely to report boosted self-confidence (90.1% vs 81.1%,  $\chi^2 [2, N = 192] = 8.29, P = .016$ ),<sup>16</sup> compared to non-sorority females (Fig. 3). Females who are in sororities are also significantly more likely to report tanning bed use prior to special events (vacation, weddings, formals, etc) than are those females who are not in a sorority (85.9% vs 79.5%,  $\chi^2 (2, N = 159) = 8.17, P = 0.017$ ).

When queried about skin surveillance at medical visits, 42.42% of all study participants reported that their primary care provider does not check their skin and 46.38% of participants reported having never seen a dermatologist for a skin check (Fig. 4). More than half (52.17%) of survey participants reported that their close blood relatives (grandparents, parents, siblings, children) had been told by a provider that they have some form of skin cancer. Within this group specifically, 97.87% agreed that tanning bed usage can contribute to the development of skin cancer.

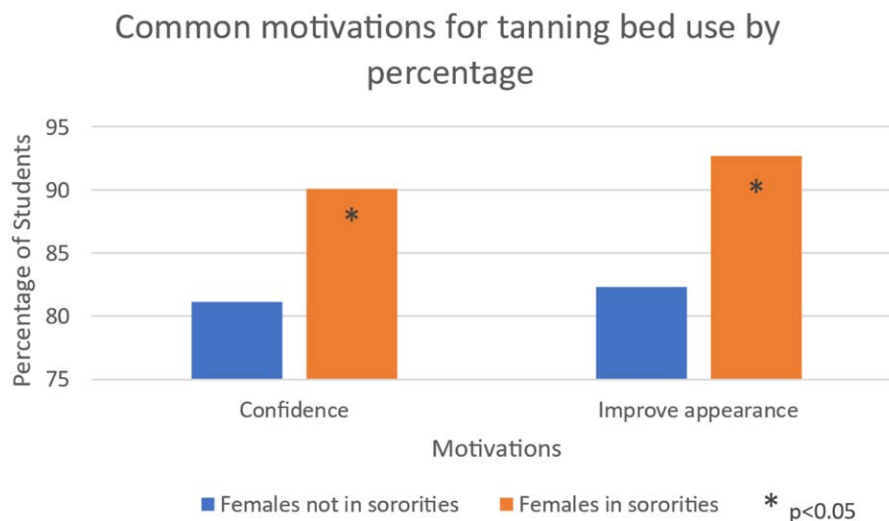
**Knowledge of tanning bed risk factors and health care interactions**

Among all participants, most (85.15%) agreed that tanning bed use is harmful, with the potential to impact their skin in the future. Similarly, most (89.32%) also acknowledged that tanning bed usage can contribute to the development of skin cancer. About half (56.4%) of respondents indicated they have received education/information about sunburns and skin cancer and their relationship to tanning bed usage.

**Qualitative results**

Study participants were asked, “What is your top reason for tanning?” The most common responses included “to look better” or “confidence” or a similarly themed response (Table 2).

Study participants were also asked, “Is there anything a health care professional could say that would make you reconsider using a tanning bed?” Common suggestions included, “That it can increase the likelihood of getting skin cancer” or “showing a picture of someone with skin cancer” or a similarly themed remark.



**Fig. 3.** Percent of female study participants in a sorority versus females not in a sorority agreeing to improved appearance and more confidence with tan skin.

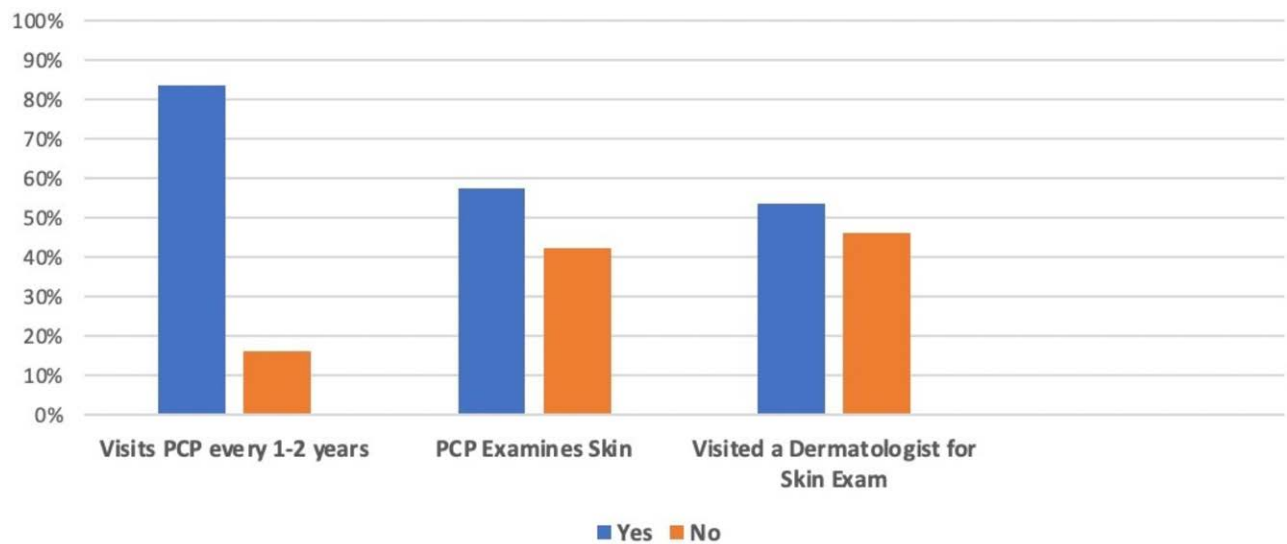


Fig. 4. Percent of participants that have had skin examined by a primary care provider and/or dermatologist.

## Discussion

### Motivations for tanning bed use

Tanning bed use is increasingly common among adolescents and young adults in the United States.<sup>18</sup> With the use of indoor tanning beds contributing to over 400,000 cases of skin cancer each year, this represents a substantial public health concern.<sup>18</sup>

In the present study, participants cited self-confidence as the most common underlying motivation for the use of indoor tanning beds, with nearly all participants agreeing or strongly agreeing that they are both more self-confident with tan skin and believe they look better with tan skin. Similarly, a 2017 interview-based study by Kirk and Greenland<sup>19</sup> cited self-image as a common factor among participants with a preference for being tan. In the present study, the importance of increased self-confidence is bolstered by free responses written by participants, where many stated that they utilize tanning beds to “look better” and “feel more confident.” Study participants used additional language to describe their reasoning for tanning, such as “not be so pale” or “not look sickly.”

A national study conducted by the Centers for Disease Control and Prevention in 2010 found that among young white women aged 18–21, those from the Midwest region reported the highest rates of tanning bed use.<sup>17</sup> This study suggests that the same demographic is more likely to use tanning beds in comparison to all participants likely because of underlying motives including self-confidence. In the present study, over 90% of participants primarily grew up in the Midwest, and winter was reported as the most common time of the year to use tanning beds. Thus, there may be a link between regional climate and the use of indoor tanning modalities. A previous study focusing on the perceptions of Oregon college students regarding UV

exposure and sunscreen use found that individuals who believe tanning can help alleviate the negative effects of winter were more likely to use indoor tanning.<sup>20</sup>

### Tanning bed use as an addictive behavior

Recent studies explore the possibility of tanning as an addictive behavior. An addiction, according to the American Psychological Association, is “a state of psychological or physical dependence (or both)...”<sup>21</sup> Some facets of addiction to tanning are similar to substance use disorder, which according to the *Diagnostic and Statistical Manual of Mental Disorders*, include a desire to cut down or stop using, a craving or urge to use, recurrent use in situations in which it is physically hazardous, tolerance, and withdrawal.<sup>22</sup> Although many of the motivators may be psychological, tanning may also have a physiologically addictive effect as well, as research has suggested that UV light may induce the production of cutaneous  $\beta$ -endorphins.<sup>23–26</sup> These endorphins may ultimately go on to stimulate receptors in the nucleus accumbens that are associated with reward and pleasure.<sup>25–27</sup> Not all studies support a correlation between UV exposure and the production of  $\beta$ -endorphins, thus more investigation is warranted.<sup>28</sup> Whatever its underlying mechanism, Cartmel et al.<sup>29</sup> label such addictive behavior as tanning dependence, and found that among individuals with tanning dependence, seasonal affective disorder is almost 3 times more frequent.

### Social groups and tanning bed use

In the present study, participants who reported being involved in a campus sorority were more likely to report the use of tanning beds. This association may be due to the number of events that sorority members participate in, such as date parties and formals. Most sorority members that participated agreed that they tan to look better for special events (weddings, formals, etc). Additionally, increased use among sorority members may be related to societal influence and the numerous beauty standards that young adults face. In a previous study focused on tanning and beauty, findings suggest that both mothers and daughters view tanned skin as more attractive than nontanned skin.<sup>30</sup> In their discussions, many also agreed that tanned skin makes one appear to be in good health.<sup>30</sup> Though the negative aspects of tanning were frequently addressed by mothers and daughters

Table 2

### Direct quotes from respondents when asked their top reason for tanning

- “To not look so pale and veiny in the winter”
- “To hide discoloration in my skin and to look better for trips”
- “So I don’t look like a ghost in the winter”
- “I am ghostly pale, so I like to tan in the summer because I get comments about how pale I am”
- “Not to burn on vacation and look good for events”

in the study, some participants still agreed that indoor tanning was an option prior to attending special events such as prom or weddings: events that often emphasize physical appearance.<sup>30</sup> An additional study notes the influence of social media on body dissatisfaction and the drive for thinness, as well as the relation that social media may have to eating disorders.<sup>31</sup> They found that individuals who compare themselves to images on social media have higher rates of body dissatisfaction.<sup>31</sup> Pressures from exposure to social media may drive the present study population, particularly females, to also achieve beauty standards, leading to risky behaviors like indoor tanning.

### Tanning bed use as a public health concern

Most participants agreed that indoor tanning is harmful and has the potential to impact their skin in the future. Further, nearly all participants acknowledged the risks tanning beds pose by agreeing to the statement, "Tanning bed usage can contribute to developing skin cancer." However, this baseline knowledge is not always a deterrent to indoor tanning. When asked what a provider could say to make students reconsider their use of tanning beds, students reported that hearing about statistics related to skin cancer and seeing visuals that depict the physical impacts of tanning may change their minds. Some responses suggested that physician presentation of individualized risk would also be influential to their decisions.

Existing studies have analyzed the motivations that lead to tanning bed cessation and continued use, including a study completed by Banerjee et al.<sup>32</sup> They found that motivations to stop using tanning beds were often related to concern about skin cancer and aging, saving money and time, and social influence from loved ones.<sup>32</sup> Meanwhile, barriers to stopping the use of tanning beds include social pressure from tanning salons and concerns about body image.<sup>32</sup> Focusing on these aspects and motivations may aid providers in navigating difficult discussions with the goal of promoting healthy skincare habits.

Just under half of participants noted that their primary care provider does not examine their skin during routine or annual medical visits. Similarly, about half of the participants stated that they had never seen a dermatologist for a skin check. For an at-risk population, the present study has revealed an area for improvement within South Dakota health care. Falk et al.<sup>33</sup> found that a physician-patient intervention at the level of primary care led to improvement in sun protection habits over a length of 3 years. This study measured attitudes regarding sunbathing and sun-protective behavior, and they noted an overall reduction in risky behavior following doctor-patient consultation.<sup>33</sup> These findings exemplify the importance of initiating preventative conversations at annual visits.

### Limitations

To our knowledge, this is the first qualitative study regarding the use of tanning beds for undergraduate students at South Dakota universities. The sample size ( $n = 321$ ) and population of this study allow data to be generalizable to surrounding states with similar demographics as the sample population is representative of the most common population that utilizes tanning beds.<sup>19</sup> Additionally, the findings from the sample population strongly suggest a common motivation for the use of tanning beds being self-confidence and body image, which aligns with the few previous studies that sampled university students.<sup>18</sup> The findings of this study are subject to recall bias as the data is self-reported; however, previous studies have shown that survey tools provide reliable and reproducible data regarding the use of tanning beds.<sup>34</sup>

Despite the limitations, this study reveals tanning patterns and behaviors of undergraduate students and sorority members, and it allows room for further analysis and improvement

in dermatologic health care for members of similar demographic groups across the world. Health care providers should continue to advocate for legislative changes regarding indoor tanning that protect youth from preventable causes of skin cancer.

### Conclusion

In the present study of South Dakota university students, many are aware of the association between indoor tanning and skin cancer—yet teenagers and young adults continue to utilize tanning beds primarily as a means to increase self-esteem and feel more confident in their appearance. Sorority members at South Dakota universities were more likely than nonmembers to use tanning beds, which may be due to events, beauty standards, and societal influence. Open discussions between health care providers and their patients about natural and artificial UV safety may be effective in dissuading risky behaviors and therefore decreasing present and future skin cancer cases in the now college-aged population. In addition to improving patient UV safety education and increasing the frequency of skin checks for young adults at primary care visits, health care providers should prioritize legislative advocacy efforts that protect youth locally and nationally. Further study will be valuable in learning more about student behavior, including student perceptions of outdoor sunbathing safety and correlation to skin cancer, which college activities or clubs lead to increased UV radiation exposure, and at what rate primary care physicians perform skin exams in at-risk populations like young adults.

### Conflicts of interest

None.

### Funding

None.

### Study approval

N/A

### Author contributions

JN, LO, MV, DK, and MF: Study conception and design. LO, AR, and JV: Data collection. JN, AR, and JV: Analysis and interpretation of results. LO, AR, JV, JN, MV, DK, MF, and AW: Draft manuscript preparation. All authors reviewed the results and approved the final version of the manuscript.

### Supplementary data

Supplementary material associated with this article can be found at <http://links.lww.com/IJWD/A45>.

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