

## Quitting the “Cancer Tube”: a qualitative examination of the process of indoor tanning cessation

Smita C Banerjee, PhD,<sup>1</sup> Jennifer L Hay, PhD,<sup>1</sup> Alan C Geller, MPH, RN,<sup>2</sup> Joshua J Gagne, MA,<sup>3</sup> A Lindsay Frazier, MD,<sup>4</sup>

<sup>1</sup>Department of Psychiatry and Behavioral Sciences, Memorial Sloan Kettering Cancer Center, 641 Lexington Avenue, 7th Floor, New York, NY 10022, USA

<sup>2</sup>Department of Social and Behavioral Sciences, Harvard School of Public Health, Boston, MA, USA

<sup>3</sup>Survey & Data Management Core, Dana-Farber Cancer Institute, Boston, MA, USA

<sup>4</sup>Pediatrics, Dana-Farber Children's Cancer Care, Boston, MA, USA

Correspondence to: S Banerjee banerjes@mskcc.org

Cite this as: *TBM* 2014;4:209–219  
doi: 10.1007/s13142-014-0257-0

### Abstract

This study examined health belief model (HBM) relevant constructs in the context of indoor tanning cessation. Telephone interviews were conducted between December 2011 and April 2012 with participants drawn from the Growing Up Today Study (GUTS) population, specifically, former tanning bed users ( $N=14$ , all females; mean age, 25.65 years) who reported frequent use in 2007, but had quit by 2010. Participants identified important motivations for quitting including health and financial reasons and the central role of family and friends in providing encouragement for indoor tanning cessation. However, participants also noted substantial barriers to maintaining indoor tanning quitting (e.g., social pressures to look good, tanning salon incentives). Participants' experience of withdrawal highlighted psychological factors more often than physical factors; some were open to resuming use in the future. The findings will be useful in intervention development to encourage cessation, the strengthening of policies to regulate the indoor tanning industry, as well as public health messaging to raise awareness of this prevalent, easily accessible cancer risk behavior.

### Keywords

Health belief model, Indoor tanning, Tanning cessation, Tanning quitting, Qualitative research

Indoor tanning is a strong risk factor for melanoma [2]. In 2009, the World Health Organization's International Agency for Research on Cancer Working Group (IARC) classified ultraviolet (UV)-emitting tanning devices (tanning beds, lamps, and booths) as carcinogenic to humans [3]. Results from recent meta-analysis that included 27 observational studies published within the past 30 years, showed that the risk of cutaneous melanoma was increased by 20 % for ever users of indoor tanning devices with artificial ultraviolet light, and the risk of melanoma was doubled when use started before the age of 35 years [2]. Besides melanoma, indoor tanners are at high risk for nonmelanoma skin cancers (squamous cell carcinoma, basal cell carcinoma) [4], premature aging including loss of skin firmness, solar elastosis, and wrinkles [5, 6], skin burns [7], and eye damage [8, 9]. Therefore, even

### Implications

**Practice:** “In the light of recent U.S. Preventive Services Task Force (USPSTF) recommendation regarding counseling children, adolescents, and young adults aged 10 to 24 years with fair skin about minimizing their exposure to ultraviolet radiation to reduce risk for skin cancer [1], practitioners should consider addressing the harms of indoor tanning in annual health check-ups with individuals with fair-skin within this age group. This will also aid in identification of individuals (particularly females) for referrals to dermatologists for a complete skin examination.”

**Policy:** Considering that several states have banned indoor tanning for all minors and many others are attempting to pass similar bans [16], policy makers should focus on strengthening and extending these policies (e.g., restricting number of times per week, banning underage tanning, warning labels outside and inside of indoor tanning parlors, etc.) to further regulate the indoor tanning industry.

**Research:** Researchers should investigate quantitative correlates of indoor tanning cessation, and develop public health messaging and interventions to increase public (and more specifically, indoor tanners) understanding of heightened short-term, and long-term health risks of indoor tanning.

though perceptions that indoor tanning is a safe way to tan are prevalent and predict use [10], there is strong evidence that indoor tanning carries important risks.

Despite the health risks associated with indoor tanning, it is a common practice, particularly among Whites, women, and adults aged 18–25 years. Approximately 30 % of white women aged 18–25 report use of indoor tanning facilities in the past 12 months [11]. Increased use has been reported among white women aged 18–21 years (referring to non-Hispanic white women who tanned in the past 12 months), with an average of 27.6 sessions per year. As well, over half (58 %) of white female indoor tanning users, and 40 %

of white male tanning users, report that they have used these facilities ten times or more in the past year [11]. Recent research has explored the idea that some patterns of tanning behavior may indicate dependence or addiction [12–15]. Therefore, identifying frequent users as dependent (or not) will have implications for introducing counseling and/or testing pharmacological interventions to treat these tanners.

Whereas several states have banned indoor tanning for all minors and many others are attempting to pass similar bans [16], public health efforts to reduce indoor tanning and motivate cessation are essential to increase awareness about skin cancer risk associated with indoor tanning. Interventions to reduce indoor tanning exposure have emphasized prevention or reduction of usage with cessation as an implicit goal [17–21], but little is known about the process by which individuals work towards indoor tanning reduction or cessation, including motivations, facilitators, and barriers to achieving cessation of indoor tanning.

Accordingly, this qualitative study was designed to examine this process among frequent indoor tanners moving towards cessation. The conceptual framework was based on the health belief model (HBM) [22]. The underlying premise of the HBM is that people adopt health or protective behavior based on perceptions about the health threats of that behavior (including both perceptions of risk, as well as perceptions of illness severity), as well as the perceived benefits and barriers of the protective behavior, behavioral self-efficacy, and cues to action [23]. The constructs of HBM have been examined in a number of prior qualitative studies on skin cancer prevention [24–26], including indoor tanning [27]. A systematic review of qualitative studies regarding skin cancer prevention in general highlighted the importance of low threat beliefs (low risk perceptions, low severity) and the perceptions of tanned skin as healthy and attractive as barriers to skin cancer prevention [28], yet none of the studies examined indoor tanning cessation in particular.

Accordingly, we examined HBM-relevant constructs (motivations for cessation, facilitators and barriers to quitting, perceptions of the quitting experience, and future indoor tanning use intentions and alternatives to indoor tanning behavior) in order to evaluate their relevance for inclusion in future indoor tanning cessation interventions. The goal for this current project was to begin to understand the process of quitting indoor tanning among former frequent female tanners—a topic that has received little prior research focus.

## METHODS

### Participants and procedure

Established in 1996, the Growing Up Today Study (GUTS) includes 9,037 girls from 50 states who are daughters of Nurses' Health Study II (NHSII) participants [29]. The study, approved by Human Subjects Committees at Harvard School of Public Health and Brigham and Women's Hospital, is described elsewhere

[30]. Mothers provided informed consent, and their daughters assented by completing baseline questionnaires. The cohort returned follow-up questionnaires annually through 2001, followed by surveys in 2003, 2005, 2007, and 2010. The girls' response rate to one or more follow-ups after baseline was 97 %.

Participants reported the frequency of tanning bed use in the past year (response options included never, 1, 2–9, 10–19, 20–29, and 30+ times). Participants for the qualitative interviews were selected if they had reported using tanning beds 10 or more times on the 2007 questionnaire and no use in the past year on the 2010 questionnaire. An email invitation was sent to the 142 women who met these eligibility criteria asking if they would be willing to participate in a 20–30 min confidential qualitative interview in exchange for a \$50 Amazon gift card; 58 (41 %) of the women responded that they would be willing. Participants were enrolled on a first come first serve basis. Twelve women were interviewed by telephone, by a trained qualitative interviewer between December 2, 2011 and January 11, 2012.

Given that we were interested in understanding the process of indoor tanning cessation, we also wanted to hear from participants who experienced withdrawal symptoms or had craving to go back to indoor tanning. On review of the first 12 interviews, none of the women had endorsed craving or feelings of withdrawal after quitting. Therefore, we selected for the women who reported the highest use (30+ in 2007) followed by no use in 2010 from the women who completed the GUTS questionnaires. A second email invitation was sent to these 24 women; two women agreed to be interviewed. These two interviews were completed in April 2012.

The interview questions (and probes) were designed to address the four HBM-related constructs (motivations for cessation, facilitators and barriers to quitting, perceptions of the quitting experience, and future indoor tanning use intentions). Table 1 provides the framework used for the interview questions.

### Data analysis

The study comprised a total of fourteen interview transcripts. We performed standard procedures of qualitative thematic text analysis to analyze the interview data, which involved a rigorous review and interpretation of the transcripts [31]. Two of the coauthors (a psychologist, a health communication scientist) coded each transcript independently and highlighted relevant content centered on the novel primary research objective: to describe the facilitators, barriers, and process of indoor tanning cessation. Following this, the coders generated narratives identifying and describing overall themes for the highlighted content. Next, the coders met to share their independent coding results and collectively generated overarching themes that addressed the study objectives [32]. Differences in identified themes were resolved through discussions and mutual agreement, a process known as consensus discussions. Consensus discussions are ef-

**Table 1** | Framework for interview probes

Issues explored	Example probes
Motivations for cessation	What were some of the main reasons you have stopped using tanning beds?
Facilitators and barriers to quitting	When you stopped using tanning beds, did you tell anyone that you had quit? (who)? Did you get any support from anyone for your decision? (who)? Conversely, did you get any pressure to keep using tanning beds? Did the tanning bed salon try to convince you to return to tanning? If so, how? (calls, email, text, coupons, mail?)
Perceptions of the quitting experience	When you stopped using tanning beds, did your use gradually decrease over time or did you just abruptly stop? Over what period of time was use decreasing and how did the frequency of use change? Some emerging research suggests that using tanning beds is actually addictive. How hard was it for you to stop using tanning beds? Did you have any symptoms of withdrawal? Probe for: “craving”, depressed mood Did you try to quit and then “relapse” and start using again?
Future indoor tanning use intentions	Do you ever intend to use tanning beds again? What about tanning in the sun? How much time do you spend tanning in the sun? How has your outdoor tanning changed since you quit using tanning beds? Has your attitude about tanning outdoors changed?

fective in attaining confidence in the outcomes of qualitative analysis, because the discussions provide for an interactive exchange opportunity among coders to generate thematic insights from data in a systematic fashion during the course of analysis [33, 34].

## RESULTS

### Participants

Table 2 presents demographic details of study participants ( $N=14$ ). All of the participants reported frequent tanning in the 2007 survey but had stopped using tanning beds as reported in the 2010 survey.

*Motivations for quitting*—As noted in Table 3, study participants identified important motivations for quitting, including health, social influence, tangible/practical, and limited utility. First, health reasons for quitting indoor tanning were mentioned frequently. Many participants discussed the heightened risk for skin cancer from indoor tanning. Some participants mentioned that they were at risk for skin cancer due to risk factors such as family skin cancer history, phenotypic factors, as well as risks associated with their history of indoor tanning use. Of note, skin-related cues to action including noticing a new mole or other skin changes prompted indoor tanning cessation, probably in the context of heightened skin threats/concerns. A few participants also expressed concerns about wrinkles and premature aging which motivated them to quit indoor tanning. Participants reported that they had had become aware of the link between indoor tanning and cancer risk from diverse sources, including family discussions regarding family skin cancer history, from magazine or journal articles such as teen magazines, the news, as well as dermatologist and other physician communication. Finally, one participant reported that personal stories of melanoma survi-

vors on Facebook made her aware about the heightened health-related risk of indoor tanning.

**Table 2** | Demographic characteristics of study participants

Characteristic	No. (%) of participants ( $N=14$ )
<b>Sex</b>	
Female	14 (100 %)
<b>Age (M, SD)</b>	
	25.65, 1.43
<b>BMI</b>	
Normal weight (18.5–24.9)	9 (64.3 %)
Overweight (25–29.9)	4 (28.6 %)
Obese ( $\geq 30$ )	1 (7.1 %)
<b>Highest grade/degree completed</b>	
Associate degree	1 (7.1 %)
Bachelor’s degree	10 (71.4 %)
Master’s degree	3 (21.4 %)
<b>Duration of indoor tanning cessation</b>	
0–2 years	4 (28.6 %)
2–4 years	6 (42.8 %)
4–6 years	4 (28.6 %)
<b>Use of tanning beds: no. of times used in 2007</b>	
10–20 times	8 (57.1 %)
20–30 times	1 (7.1 %)
30+ times	5 (35.7 %)
<b>Use of tanning beds: frequency of use (when using)</b>	
Seasonal—1–3 times per week	7 (50.0 %)
In preparation for special events—2–4 times per week	5 (35.7 %)
In preparation for special events—daily	1 (7.1 %)
No answer	1 (7.1 %)

**Table 3** | Motivations (and frequency of responses) for quitting indoor tanning

Themes (N)	Supporting participant quotations
<b>Health-based reasons</b>	
i. Concerns about skin cancer/cancer (13)	<p>“It’s just more of the research that has been done on the links between tanning beds and.... the cancer that was developing because of tanning beds.”</p> <p>“Well, I’ve been trying not to because, uh, skin cancer does run in my family...My aunt had melanoma, and, I’m pretty fair skinned, so I’m pretty... I have a lot of moles, so I’m pretty prone to, I guess, GETTING skin cancer? So... um, so I’m kind of feeling guilty, I guess? (Chuckles) So, I tried to stop.”</p> <p>“I mean, I do have some concerns about skin cancer in the future, so that’s part of why I don’t feel the need to be tan anymore.”</p> <p>“And, you know, now that I’m older and I see the effects of tanning beds, and I see, you know, um, I mean, young people getting skin cancer, and the effects that it causes? I mean, I... I don’t... you know, to me it’s not worth it. It’s not worth, you know, having that... that “glow” or whatever... um, and risk, um, skin cancer. I mean, I’ve had some moles that I’ve had removed, BECAUSE I was worried, um, you know, because their shape and the coloring of them? And, that also concerns me that, you know, I was getting those BECAUSE of a tanning bed.”</p> <p>“...because I was a lifeguard when I was a teenager, for about five years in the summertime? And, I never wore sun screen, so I was already at a high risk of skin cancer, and I didn’t want to compound that by going to a tanning bed...”</p>
ii. Found a mole/concerns about skin damage (3)	<p>“Well, I found a mole on my left breast that I know has not been seeing the daylight, and, I had to have it removed. And I’m lucky enough that it was benign, but, um, that really opened my eyes that... you know, that could only have been caused by the tanning bed.”</p>
iii. Concerns about wrinkles and aging skin (3)	<p>“I think it’s more important to... protect my skin from aging, mostly, is kind of what I think about when I think about the sun damage?”</p> <p>“I didn’t want to, you know have old ugly wrinkly skin when I was older.”</p>
<b>Tangible reasons</b>	
i. Financial reasons/costs (6)	<p>“Well, it got pretty expensive. Um, which was probably the first reason?”</p>
ii. Time issues (2)	<p>“Um, well, yeah. I mean, I have kids, and so it was taking time – I was trying to do it after work and then go pick ‘em up from daycare – and it was taking away time from them, so, that was another important reason to stop.”</p>
iii. Moved to a different location (2)	<p>“Well, I... um, I moved to Arizona (chuckles). So, there’s really (laughing) no longer a need to go tanning, because it’s pretty much sunny every day.”</p>
<b>Social influence</b>	
i. Pressures from parents/family (5)	<p>“Oh, yeah. Mostly from my father, um, ‘cause he’s also had, um, not melanoma, but he’s had some skin cancer before and, um... so, he’s always getting on me to not do it.”</p> <p>“So, she [Mother] was always... I don’t even know if she knew that I ever used a tanning bed, but, she was always, you know, definitely was very discouraging about it, um, you know, or, you know, talked about it like, in terms of, “Don’t ever use those,” or (chuckles), you know, “That’s not... it’s not wise to use ‘em.” And, AND talked about in the future that my...my skin type, and because of our family history, that I probably WILL be prone to the risk of skin cancer?”</p>
ii. Pressures from friends/coworkers (2)	<p>“Um, well, I got a lot of... I work at a hospital, and got a lot of flack for usin’ them as we refer to them – “The Cancer Tube.” And so, I decided (chuckles) to stop doin’ that, and then just the cost of doing it.”</p>
<b>Limited utility</b>	
i. Grew out of it (6)	<p>“I’m not as, uh... too particular about my appearance as I was when I was younger, when I used them more frequently.”</p> <p>“I think maybe I grew out of it a little bit? It’s that possibility, you know... after I got away from campus and college and listen to what everybody’s doing, it was kind of like, “You know? I don’t really need to do this anymore.”</p> <p>“Oh, I don’t feel the need to be tan anymore...I don’t care what I look like, I guess?”</p> <p>“Well, you know, when I was younger, I mean, I tanned, of course, for proms and weddings, and... I mean, after that I really found no need for it?”</p>
ii. Didn’t enjoy tanning beds anyways (2)	<p>“I never really enjoyed it very much.”</p> <p>“Um, I just wasn’t very comfortable with them.”</p>

Social reasons for quitting indoor tanning included direct pressures from family members and friends that motivated them to consider quitting. For example, one participant worked at a hospital and shared that coworkers motivated her to stop indoor tanning, referencing tanning beds as “The Cancer Tube.” Participants also discussed tangible or practical reasons such as increasing costs of indoor tanning, lack of time for indoor tanning, and moves to different parts of the country as factors that motivated them to consider

**Table 4** | Facilitators and barriers to indoor tanning quitting

Themes (N)	Supporting participant quotations
<b>Facilitators</b>	
Family/friends (11)	<p>“...I told my husband... that I wasn’t going to do it anymore, and I think he...you know, was very, uh... happy about that. He’s very fair-skinned. So he has, you know, the issues with just, in the sun, too. Whereas, I tan more easily. So, he was very happy about it, you know, just for health concerns and financial reasons as well.”</p> <p>“I mean, my mom has always encouraged me to... not to... not go to tanning beds because um, she’s a nurse and, obviously, probably thinks that, it’s pretty clear that using tanning beds is not good for you (chuckling)... I would say she feels better.”</p> <p>“My husband likes me to be tanned? But when I told him I stopped going, I... I use the self-tanner? The lotions and the sprays now? So, he was happy about that.”</p>
<b>Barriers</b>	
Family/friends (3)	<p>“...a few years later, my sister got married, she had said, ‘Well, are you gonna tan for the wedding?’ And I had told her no, because I didn’t believe in the use of them anymore.”</p> <p>“I know every single time that I DO go tanning? I’ll go to work or whatever, and then somebody always comments on it and how much better I look? (Chuckles)... And, uh, how I have sort of a “healthy glow” to me, and, how much... I’ve gotten a lot of comments of how it just... it looks nice?”</p> <p>“I wouldn’t say I felt pressure, um.... I know people that go probably like once a week... once a week or so. Um, and they still really like it. Um, but, and you know, we’d have conversations, like, like, “Gosh, I can’t give it up.” You know?”</p>
Tanning salons (10)	<p>“Um, I don’t remember them calling or sending me emails, but I do remember when... when I tried to cancel? I mean, like, when I walked in to cancel? And I remember feeling a little bit nervous about going IN to cancel? But they DO try to convince you to stay, like, they start... start tellin’ you about new offers. Like, “Oh, we can reduce it by this much, or we can give you this new offer, or we can...” you know? They tried to... they tried really hard to get you to stay. I mean, it’s, it’s hard to cancel. Um, and I was... had to go in there with a bunch of... I mean, because I... I have a hard time with that, and I KNEW that they were gonna try to do that. So I walked in there knowing, like, “Okay, I’m deciding I’m already gonna stop. So, no matter what they say to me, like, I’ve already made my decisions.” And no matter how hard they try you know, “I’m... I’m done.” You know, and so, but they did. They really pressured me, and, and I... the girl... the girl that was tryin’ to get me to stay, she was really pretty, like, like, fresh to me? ‘Cause I’m sure that it affected her, you know, I mean, she probably... I don’t know if it looked bad on her that she couldn’t get me to stay? Um, if it somehow reflected on her, and performance? I don’t know, but, um, but she was like really irritated that I was canceling.”</p> <p>“Yes, received phone calls offering discounts/upgrades to come back.”</p> <p>“I got their usual monthly email with their specials. But I don’t think it was targeted because I had dropped. I think... it was something that I was getting, even while I was a member at the salon.”</p> <p>“Um...no, other than just like flyers in the mail, um, as far as like their specials and whatnot. That’s really all I’ve ever got from them. They never called me or anything to come back, no.”</p> <p>“I mean, I’m just an advocate for not usin’ it, ‘cause, I mean, I think it damages your skin, and they don’t really tell you that a whole lot. When you’re using it, they tell you that it’s good for you (chuckles), so... pretty much, so (chuckles).”</p> <p>“I think the one thing that I think about when you ask me about tanning salons, is just the grave amount of misinformation, and really, lying, that they do to convince customers that it’s safe. And not as harmful as if you lay out in the sun; or, that it’s actually good for. All these different things have ALWAYS bothered me! (Chuckles lightly).... Um, so that’s something I have run into with several different tanning salons, in the past. I mean, I still remember a classmate of mine, I mean, just everyone seemed to be... sentiment... that actually isn’t as bad as they tell you it is... um, and, I think... I just think an awareness is... there must be a correlation between... um, education level and... ‘cause... you know, so, just being able to understand information, learn your sources...and getting lies about making decisions, I just feel like that’s probably where most of my information about tanning salons come from.”</p>

quitting. Finally, participants discussed the diminishing personal utility of indoor tanning as they grew older and became less preoccupied with their appearance. Finally, a few participants noted that they never really enjoyed indoor tanning in the first place, and so were highly motivated to quit.

*Facilitators and barriers to quitting*—The results summarizing facilitators and barriers to quitting are presented in Table 4. Participants described the central role of family and friends in providing encouragement for cessation of indoor tanning. Accordingly, one participant noted that her mother was a nurse and frequently advised her against indoor tanning; therefore, she was very happy with her decision to quit. One participant indicated that several friends stopped using tanning beds with her, and hence, made it a supportive environment for both the friends to stay away from indoor tanning.

However, participants noted substantial barriers to quitting indoor tanning use. Social pressure in many forms represented the preponderance of these barriers. One participant mentioned that the compliments she regularly received regarding her appearance had ended once she quit indoor tanning. Another participant reported that her friends continued to tan, and to discuss tanning benefits, making her question her own decision to quit. Many participants reported a major role of tanning salons in providing the social pressure for them to return to use indoor tanning facilities including solicitations to renew their memberships, or to make it extremely difficult to cancel memberships. Participants reported that some salons solicited them more directly by calling them—after they had already canceled their membership—to offer upgrades and discounts. Others received flyers in the mail or weekly emails with encouragement to return to indoor tanning facilities. Finally, while discussing the barriers to quitting indoor tanning use, participants also noted the misinformation provided by tanning salons to convince customers that indoor tanning was safe and beneficial for them.

*Perceptions of the quitting experience*—The results summarizing perceptions of the quitting experience are presented in Table 5. Participants reported three aspects of the quitting experience, consisting of the quitting process, withdrawal, and relapse. Regarding the quitting experience, most of the participants reported that they quit abruptly after making the decision to do so, although a few participants did quit more gradually. Most participants did not experience any withdrawal symptoms and perceived the quitting process to be easy; most had no desire to resume tanning. However, a few participants reported some psychological urges to go back for indoor tanning and perceived the quitting experience as somewhat difficult. For instance, one participant shared that she missed the glow that came on her skin after indoor tanning; another expressed that she missed the esthetic appeal of the tanned look. One participant noted that the urge to go back to indoor tanning was a physical

urge, and expressed it as a longing for the warmth and sensation she experienced while indoor tanning (therefore, we classified her urge as a psychological one). Finally, most participants—although not all—did not relapse to indoor tanning. The two participants that did relapse did not provide a time frame when the relapse happened, but the methods employed for identifying frequent tanners who had quit by 2010 suggest that the relapse may have occurred after they answered that they had quit and scheduling the interview.

*Future indoor tanning intentions*—The results summarizing future indoor tanning intentions are presented in Table 6. A majority of participants stated that they had no intention of ever going back to indoor tanning. Yet for many, the tanned look remained sought after, and they reported that they would still seek to achieve this via safe options such as spray tans. A few participants stated that they would consider indoor tanning again—some for special occasions only, or to build up a “base tan.”

When asked about tanning in the sun as an alternative to indoor tanning, participants discussed both sun tanning behaviors and use of sunless tanning products. With regard to sun tanning, a majority of the participants talked about tanning in the sun, with frequency noted as “weekly in the summertime” to “1–2 days/month, year round.” Many participants also discussed sporadic sun tanning, particularly during summer months, during vacations or social outings such as going to the beach with friends or laying out at the pool. A couple of participants noted that they try to get some sun on their skin when they are outside and doing gardening or working in the yard. These participants clearly noted that they don’t lay out in the sun for tanning, but they do make a deliberate effort to get some tan while working outside. Finally, three participants noted that they don’t sun tan and limit their time outdoors in the sun.

We also inquired about use of sunless tanning products, and the participants were evenly distributed among the users and nonusers. Whereas three participants noted that they had never used the products, four participants noted that they had tried them, but did not like them. The reasons noted for not liking these products included the artificial nature of the products, the “orange” color on the skin as a result of spray tanning, and the residue and color on clothes, sheets, and pillows. However, the other remaining participants endorsed use of sunless tanning products, and noted different reasons including to prepare for special events and weddings, getting ready for summer, and as an alternative to indoor tanning.

## DISCUSSION

This qualitative study examined the motivations, processes, and outcomes of indoor tanning cessation in a group of adult women. Consistent with a central concept of the health belief model, which posits that

Table 5 | Indoor tanning quitting experience

Themes (N)	Supporting participant quotations
<b>Quitting process</b>	
i. Abruptly stopped (12)	<p>“Um, I just abruptly stopped. Honestly, I was getting married last Fall, and that was the last time I used it. And then I got married, and then I... didn’t use it after that.”</p> <p>“Yeah. I kind of just... I pretty much just stopped goin’. It was like, I went one day; and then the next week, I didn’t go.”</p> <p>“Yeah. It was kind like, I was using it, and then I moved, and then I just never went back to it. So I guess it’d be KIND of abrupt?”</p> <p>“Um, I just cold turkeyed. Abruptly stopped.”</p>
ii. Gradually stopped (2)	Gradually decreased use over a 3–6 month period, then stopped.
<b>Withdrawal</b>	
i. Quitting easy, no withdrawal (9)	<p>“No, I... it wasn’t hard for me. I... I don’t care to go back at all.”</p> <p>“I personally did not find it enjoyable. So, for me, quitting... like, going to...it wasn’t a big thing.”</p> <p>“No. I did not. Um, I’d never felt addicted to tanning beds, um, I didn’t have a problem stopping, just because once I made up my mind that it was the right thing to do, and that I needed to do it to be healthy, I just did it, um, and so I never desired to go back. I never had any symptoms of depression or, um... you know anything like that.”</p>
ii. Quitting somewhat difficult, psychological urge (5)	<p>“Um... and I guess you could say, yeah, I miss... I mean, I miss being able to have that... that glow? ‘Cause I always think back, and I think that looks better, uh, to have a tan? So like, I mean, I DID miss it? But, um... I wouldn’t say I had like withdrawals from it.”</p> <p>“Yeah, um... I would say, you know, sometimes I... well, lately, I’ve been looking in the mirror and I just see my pale face, and I miss my tanned face! (Chuckles).. So, um... so, yeah, I mean, I miss the aesthetic appeal of it, I guess. And then also, um... I mean, it is, it IS just nice. There is some... something to it, where, um... it does make you feel better. And I think once... it’s really, for me, it’s once I START again, it’s, like I just keep wanting to go back more frequently throughout the week, um... and it’s hard to stop. But then once I’m stopped, I’m okay, you know.”</p> <p>“Yes, I did! (Chuckles)... Just that, I mean, after a couple weeks of stopping and just noticing that, you know, my skin wasn’t as tan anymore, and it was... it was in the middle of winter, so I really enjoyed coming out and feeling warm and tan, um, and afterwards, I kind of started lookin’ a little bit at the cost of it and possibly going back. Um, I wouldn’t say I was necessarily SAD about it? But I did feel that... that urge to want to go back and do it again...I would say it was a physical urge. I just, I enjoyed the sensation, I liked how warm and happy it made me? Um... and so, I think it was more of a physical urge”</p>
<b>Relapse</b>	
i. No relapse (7)	
ii. Yes, did relapse (2)	<p>“Hm... yeah, I would say. I mean, this... this past time is probably a relapse, ‘cause I told myself I wouldn’t do it. I wouldn’t tan. Or, and I was being really good about it for a year or so (chuckles), but... and then went back.</p> <p>“But, uh... I don’t know. I mean, it’s just usually like a spurt of a couple of weeks each year.”</p>

perceptions of health threat are primary motivators of health protective behavior, we identified primarily health-related motivations for indoor tanning cessation. Social encouragement to quit was also mentioned as a frequent motivator of cessation; this support could be serving as “cues to action” in those who were considering quitting. This finding is consistent with literature showing that those who use indoor tanning facilities are relatively well-educated concerning the health risks and skin-

related harms of this behavior [35, 36]. Stapleton and colleagues [20] used latent profile analysis to examine participant responses on appearance-enhancement beliefs, normative beliefs, relaxation beliefs, appearance-damage knowledge, and health-damage knowledge to create profiles of four sub-groups of tanners: knowledgeable-appearance tanners, low-knowledge tanners, low-knowledge, relaxation tanners, and knowledgeable, low-appearance and low-relaxation tanners. Their appearance-

Table 6 | Future indoor tanning intentions

Themes (N)	Supporting participant quotations
Future intentions	
i. No, definitely not (7)	<p>“I would say definitely not.”</p> <p>“No. I would never, um... I just thought, you know... I just don't... like I said, with what I know about skin cancer, and the effects that I know use to... if I was gonna go back to a salon to tan, I would probably go and opt for a spray tan or something safer like that.”</p>
ii. Probably not/only a slim chance of use again (4)	<p>“[Pauses] I... don't intend to. But... I mean, yeah, I would say, that... there's a very slim chance that I would...Like, a 2 % chance. Like if I went on Dancing with the Stars.”</p> <p>“Um, again, if there was a big event, where I felt like it would help if I was a little bit tanner? I might go for a little bit? I don't tan very well, like, naturally, out in the sun? And so that's kind of an easy way to build up like a small base tan.”</p> <p>“I guess, maybe if there was an important event, like, if my brother got married I might... and I was in the wedding, I would possibly think about it? But, I really doubt it.”</p>
iii. Probably will (3)	<p>“Yeah, I probably will, but I'll probably make it more, really FOR an event that I needed to be... or feel a little darker for? Um, but I don't think I would go back for no reason.”</p> <p>“[Takes a deep breath] I probably will.”</p>
Alternatives to indoor tanning: sun tanning	
i. Weekly in the summertime (4)	
ii. Tanning 1–2 days/month, year round (1)	
iii. During vacations/social outings (4)	<p>“Um... usually, I mean, I'm only at the beach one week a year, so... I mean, maybe I'm in that sun for, you know, five hours a day that week. And that's really the only time I get out.”</p> <p>“Um, sometimes in the summer? More of like a social thing... I've got friends who were going to lay out at the pool, so I'll go with them and we'll hang out and like, lay out in the sun, too. But only during the summers, or on vacation.. Um, like five or ten times over the summer?”</p>
iv. Engagement in more outdoor activities in the spring or summer to get sun, but not specifically laying out to tan (2)	<p>“Um, every weekend I try to get out in the sun for a little bit, just doing yard work and whatnot, and I'll wear something that I can tan my shoulders. I don't ever lay out, but I'll... I'll go outside to do yard work with the intention of getting some sun.”</p> <p>“Um... actually, I don't tan outside... as much as I used to when I was, um, a teenager. But I... because I work, um, and I don't have a pool or anything like that. Um... but, I would just say, I mean, typically I'll... it's just whatever time I spend in the sun on the weekend? Like, gardening, or doing whatever.”</p>
v. Don't lie out to tan or spend much time in the sun at all (3)	<p>“Not much. Yeah, I don't really spend that much time in the sun, um, in general.”</p>
Alternatives to indoor tanning: sunless tanning products	
i. Have tried them but don't like them (4)	<p>“No...Um, I've tried different lotions and everything. But I, I never really liked them, so.”</p> <p>“Not currently. I haven't in about two years...They... um, didn't really look legitimate? They looked very artificial?...I used to go, yeah, to the booth and have it done. Um... and I also, um, I felt like it rubbed off on my clothes a lot.”</p> <p>“I've used it once before. I can't remem... I think it was before, um, I used the tanning beds for txhe last time... Uh, I think they kind of turn you orange? I don't like the look of them.”</p> <p>“I have used self-tanner in the past, but I've also, um, years ago, I got a spray tan...self-tanners I'm not a fan of, just because it makes me look orange. And then, the spray tan, I've... um, I got one when it first came out? And, I just didn't like... um, they were like all over my sheets and my pillows, and I didn't like them so I haven't gone back.”</p>
ii. Use them to prepare for events	<p>“Um, again, as an event, if I'm wanting to get a little darker for an event, I'll... I'll use some of the lotions, or the sunless, with the sprays.”</p> <p>“Only once in awhile, before an event or something... I use a lotion that you can apply that you get over the counter.”</p>



Table 6 | (continued)

Themes ( <i>N</i> )	Supporting participant quotations
	“Um, yeah. I actually have tried some of the... um, lotions. Um, especially for my sister’s wedding, well, ‘cause I did feel like I need to have some color, ‘cause her winter... um, her wedding was in the winter months. And, um, so I did try some... some of those tanning products. But that was really the only time. I haven’t really used it, other than that.”
iii. Use them sporadically in the summer/to prepare for summer (2)	“Oh – has that changed since I quit. Um, not really. I mean, I guess I used it occasionally... used them occasionally, before I had used the tanning beds, too? So, it’s pretty much the same – I use them sporadically, in the summer.” “I don’t use ‘em that much, now. I might use them now for, um... for summer, like to get ready for the summer. ‘Cause again, I live in England, so it’s not... there’s a lot of sun and opportunity to just hang out. But, um... they’ve definitely improved a lot over the years. The smell’s improved in the way that they... whatever it is that’s interacting with their dermus, and in a way... I don’t know,... splotchy... I mean, I just think there’s so many, the products out there, but, I just, um... my experience with them has been good, and I’ve been happy with them when I want to use them, which isn’t that frequently. So... You know, like... you know, it would be totally different if I lived in Texas, where my mom probably uses it, you know, from March to October, every... every week. So, I would say when I was living in the US, um, I was probably using it at least once a week.”
iv. Use them as an alternative to tanning beds (2)	“I...well, just this... just recently, I started using this tanning... a self-tanning lotion, and it builds your tan gradually, and I sort of have been supplementing the tanning... I mean, I used it while I was tanning, and then I’ve used it as I’ve stopped, um... but I’ve just kind of continued what I, what I got, I guess” “Yeah. ‘Cause when I was... when I was tanning in the tanning beds, I never used a sunless tan... since I’ve stopped going to the tanning beds, um, that’s... that’s all I use, now. I use the sprays and I use the lotions, also.”
v. Has never tried/does not use sunless tanning products (3)	“No. I haven’t used any of those.”

focused intervention significantly reduced indoor tanning for the low-knowledge subgroup only, raising further questions as to how to engage young adult women indoor tanners who are knowledgeable and aware of the health effects of the indoor tanning. Understanding readiness for cessation among these sub-groups of indoor tanners will help in channeling them through appropriate type of counseling or pharmacological cessation interventions.

Interestingly, participants frequently discussed barriers to quitting that included both social pressures to resume or to maintain indoor tanning by promotions from the salons. These findings represent important barriers in women’s decisions to cancel or fail to renew their indoor tanning memberships. Research on body image shows that both body image and depression are associated with tanning behaviors and attitudes [37], further highlighting that social pressures to resume or maintain indoor tanning can act as substantial barriers to quitting, particularly for those indoor tanners that battle with depression or body issues.

The psychological experience of withdrawal (missing the warmth and relaxation associated with tanning) was mentioned more often than physical symptoms of withdrawal, although this in no way negates the fact that many frequent users may experience physical withdrawal symptoms when stopping indoor tanning

[12]. In fact, there is growing evidence that suggests that excessive indoor tanning may be an affective disorder, similar to substance-use disorder [12–15]. The release of endogenous opioids when the skin is exposed to UV radiation most likely accounts for the mechanism of tanning dependence [38] and requires further exploration. As well, recent research indicates that indoor tanning is of concern not only for its association with skin cancer but for its association with psychiatric and substance use symptoms [39]. Therefore, cessation counseling or interventions will need to be tailored to individual women with certain psychological problems who seek relief from their symptoms by indoor tanning.

Interestingly, we did not identify material consistent with self-efficacy beliefs from the health belief model as motivators of indoor tanning cessation. This may be because most participants did not experience challenging physical withdrawal symptoms, nor did they relapse to indoor tanning. Additionally, most participants did not quit gradually. Most quit abruptly, once they made the decision to do so, indicating possibly a high level of quitting self-efficacy in this sample. While their ease of quitting provided a good sign that they could easily act on their decisions, the substantial barriers they faced were prominent as well. Perhaps not

surprisingly, indoor tanning facilities provided incentives for more frequent tanning, with promotional deals that allowed unlimited tanning within a certain time period for the same price, set up system barriers to canceling memberships, or even had staff members call to encourage members to reinstate their package deals. Furthermore, women met with social pressure to resume tanning—either because of compliments they received on their looks that they failed to get once they quit, as well as indirect encouragement to continue visiting indoor tanning facilities when others in their social circle continued to use. Any of these could present significant challenges to maintaining indoor tanning cessation, and could be addressed in intervention strategies to support cessation efforts.

Alternatives to indoor tanning were frequently discussed among indoor tanners who had quit and included sun tanning and use of sunless tanning products. Although research on use of sunless tanning products is sparse, recent research suggests that encouraging exclusive use of sunless tanning products may be a practical prevention strategy that recommends indoor tanning cessation coupled with education about these appearance-enhancing alternatives [40]. As well, because some indoor tanners started tanning in the sun, it is extremely important to critically evaluate the tanning behaviors utilized for appearance enhancement, so that melanoma prevention education can be all-inclusive and can recommend safe alternatives to indoor tanning (while also clarifying that sun tanning is not a better alternative).

The environmental, market-driven, and social barriers to maintaining indoor tanning cessation dictate a multi-level approach to understanding indoor tanning and cessation of these behaviors; individual-level factors such as health threat perception are only one important motivating force to encourage cessation, but failing to address environmental and social barriers may lead to habitual and sustained use of indoor tanning facilities. Therefore, interventions to promote indoor tanning cessation could usefully address individual-level factors, social factors (to enhance family and friends support to quit, and processes to stand firm even when users experience social encouragement to remain users), as well as to help users anticipate and counteract industry practices that encourage continued memberships and frequent use through financial incentives, misinformation, and employee-initiated persuasion to remain.

There are limitations to our current work. The study comprised a small group of self-selected participants, primarily due to budgetary constraints, so generalizability is limited. Standards for qualitative interviewing note that between 10–15 interviews are adequate to achieve a saturation of themes in a homogenous group of individuals [41], which is consistent with the number of interviews we conducted here ( $N=14$ ). The goal for this current

project was to begin to understand the process of quitting indoor tanning—a topic that has received little prior research focus, and the results warrant further research to understand the environmental and market-driven barriers to quitting indoor tanning. Our findings require follow-up quantitative research examining the relative value of predictors of cessation in order to examine generalizability. Additionally, we describe the process of quitting among those who have already quit. While this retrospective focus has revealed critical information, prospective examination of this process would also be valuable in intervention development. Given that our focus was on understanding the quitting process, we did not ask details about the age when the participants started using indoor tanning and the age at which they quit. Finally, the study was limited to women. While indoor tanning use is more common in women, future work could extend both qualitative and quantitative studies in indoor tanning cessation to men, as well.

In conclusion, this study represents one of the few studies on cessation of indoor tanning use, and helps to anticipate important challenges women face as they initiate and maintain cessation of this potentially addictive behavior. The findings reported here will be useful in intervention development to encourage cessation, the strengthening of policies (e.g., restricting number of times per week, banning underage tanning, etc.) to regulate the indoor tanning industry, as well as public health messaging to raise awareness of this prevalent, easily accessible cancer risk behavior.

**Acknowledgement:** This work was supported by the National Cancer Institute Specialized Programs of Research Excellence (SPORE) in Skin Cancer (Thomas Kupper PI, Brigham and Women's Hospital).

1. U.S. Preventive Services Task Force. Behavioral counseling to prevent skin cancer: Recommendation statement. AHRQ Publication No. 11-05152-EF-2. Accessed from the U.S. Preventive Services Task Force Web site <http://www.uspreventiveservicestaskforce.org/uspstf11/skincancouns/skincancouns.htm>.
2. Boniol M, Autier P, Boyle P, Gandini S. Cutaneous melanoma attributable to sunbed use: systematic review and meta-analysis. *BMJ*. 2012; 345: e4757.
3. Clough-Gorr KM, Titus-Ernstoff L, Perry AE, Spencer SK, Ernstoff MS. Exposure to sunlamps, tanning beds, and melanoma risk. *Cancer Causes Control*. 2008; 19: 659-669.
4. Ting W, Schultz K, Cac NN, Peterson M, Walling HW. Tanning bed exposure increases the risk of malignant melanoma. *Int J Dermatol*. 2007; 46: 1253-1257.
5. Westerdahl J, Ingvar C, Masback A, Jonsson N, Olsson H. Risk of cutaneous malignant melanoma in relation to use of sunbeds: further evidence for UV-A carcinogenicity. *BMJ*. 2000; 82: 1593-1599.
6. WHO International Agency for Research on Cancer (IARC) Monograph Working Group. A review of human carcinogens—part D: radiation. *Lancet Oncol*. 2009; 10: 751-752.
7. Lazovich D, Vogel RI, Berwick M, Weinstock MA, Anderson KE, Warshaw EM. Indoor tanning and risk of melanoma: a case-control study in a highly exposed population. *Cancer Epidemiol Biomarkers Prev*. 2010; 19: 1557-1568.
8. Wehner MR, Shive ML, Chren MM, Han J, Qureshi AA, Linos E. Indoor tanning and non-melanoma skin cancer: systematic review and meta-analysis. *BMJ*. 2012; 345: e5909.
9. Pierard GE. Ageing in the sun parlour. *Int J Cosmet Sci*. 1998; 20: 251-259.

10. Quatresooz P, Henry F, Paquet P, Pierard GE. Photoaging under recreational sunbeds. *Skin Res Technol*. 2011. doi: 10.1111/j.1600-0846.2010.00498.x [Epub ahead of print].
11. Mogensen M, Jemec GB. The potential carcinogenic risk of tanning beds: clinical guidelines and patient safety advice. *Cancer Manag Res*. 2010; 2: 277-282.
12. Costagliola C, Menzione M, Chiosi F, Romano MR, Della Corte M, Rinaldi M. Retinal phototoxicity induced by hydrochlorothiazide after exposure to a UV tanning device. *Photochem Photobiol*. 2008; 84: 1294-1297.
13. Walters BL, Kelley TM. Commercial tanning facilities: a new source of eye injury. *Am J Emerg Med*. 1998; 5: 386-389.
14. Levine JA, Sorace M, Spencer J, Siegel DM. The indoor UV tanning industry: a review of skin cancer risk, health benefit claims, and regulation. *J Am Acad Dermatol*. 2005; 53: 1038-1044.
15. Centers for Disease Control & Prevention. Use of indoor tanning devices by adults—United States, 2010. *MMWR Morb Mortal Wkly Rep*. 2012; 61: 323-326.
16. National Conference of State Legislatures. Indoor tanning restrictions for minors: a state-by-state comparison. Accessed from the National Conference of State Legislatures Web site <http://www.ncsl.org/research/health/indoor-tanning-restrictions.aspx> 2013.
17. Gibbons FX, Gerrard M, Lane DJ, Mahler HIM, Kulik JA. Using UV photography to reduce use of tanning booths: a test of cognitive mediation. *Health Psychol*. 2005; 24: 358-363.
18. Hillhouse J, Turrisi R. Examination of the efficacy of an appearance-focused intervention to reduce UV exposure. *J Behav Med*. 2002; 25: 395-409.
19. Hillhouse J, Turrisi R, Stapleton J, Robinson J. A randomized controlled trial of an appearance-focused intervention to prevent skin cancer. *Cancer*. 2008; 113: 3257-3266.
20. Stapleton J, Turrisi R, Hillhouse J, Robinson JK, Abar B. A comparison of the efficacy of an appearance-focused skin cancer intervention within indoor tanner subgroups identified by latent profile analysis. *J Behav Med*. 2010; 33: 181-190.
21. Turrisi R, Mastroleo NR, Stapleton J, Mallett K. A comparison of 2 brief intervention approaches to reduce indoor tanning behavior in young women who indoor tan very frequently. *Arch Dermatol*. 2008; 144: 1521-1524.
22. Becker MH. The health belief model and personal health behavior becker. *Health Educ Monogr*. 1974; 2: 324-508.
23. Hillhouse J, Turrisi R. In: Motivations for indoor tanning: theoretical models. In: Heckman CJ, Manne SL, eds. *Shedding light on indoor tanning*. New York, NY: Springer; 2012: 69-86.
24. Gerbert B, Johnston K, Bleecker T, McPhee S. Attitudes about skin cancer prevention: a qualitative study. *J Cancer Educ*. 1996; 11: 96-101.
25. Glanz K, Carbone E, Song V. Formative research for developing targeted skin cancer prevention programs for children in multiethnic Hawaii. *Health Educ Res*. 1999; 14: 155-166.
26. Wright L, Bramwell R. A qualitative study of older people's perceptions of skin cancer. *Health Educ J*. 2001; 60: 256-265.
27. Murray CD, Turner E. Health, risk and sunbed use: a qualitative study. *Health Risk Soc*. 2004; 6: 67-80.
28. Garside R, Pearson M, Moxham T. What influences the uptake of information to prevent skin cancer? A systematic review and synthesis of qualitative research. *Health Educ Res*. 2010; 25: 162-182.
29. Colditz GA, Hankinson SE. The Nurses' Health Study: lifestyle and health among women. *Nat Rev Cancer*. 2005; 5: 388-396.
30. Berkey CS, Rockett HR, Gillman MW, Colditz GA. One-year changes in activity and in inactivity among 10- to 15-year-old boys and girls: relationship to change in body mass index. *Pediatrics*. 2003; 111: 836-843.
31. Bernard H, Ryan G. Text analysis: qualitative and quantitative methods. In: Bernard H, ed. *Handbook of methods in cultural anthropology*. Thousand Oaks, CA: Sage Publications; 1998: 595-646.
32. Miles MB, Huberman AM. *Qualitative data analysis: an expanded sourcebook*. Thousand Oaks, CA: Sage Publications; 1994.
33. Barbour RS. Checklists for improving rigour in qualitative research: a case of the tail wagging the dog? *BMJ*. 2001; 322: 1115-1117.
34. Morse JM, Barrett M, Mayan M, Olson K, Spiers J. Verification strategies for establishing reliability and validity in qualitative research. *Int J Qual Methods*. 2002; 1: 1-19.
35. Knight JM, Kirincich AN, Farmer ER, Hood AF. Awareness of the risks of tanning lamps does not influence behavior among college students. *Arch Dermatol*. 2002; 138: 1311-1315.
36. Robinson JK, Kim J, Rosenbaum S, Ortiz S. Indoor tanning knowledge, attitudes, and behavior among young adults from 1988-2007. *Arch Dermatol*. 2008; 144: 484-488.
37. Gillen MM, Markey CN. The role of body image and depression in tanning behaviors and attitudes. *Behav Med*. 2012; 38(3): 74-82.
38. Mosher CE, Danoff-Burg S. Addiction to indoor tanning: relation to anxiety, depression, and substance use. *Arch Dermatol*. 2010; 146: 412-417.
39. Heckman CJ, Cohen-Filipic J, Darlow S, Kloss JD, Manne SL, Munshi T. Psychiatric and addictive symptoms of young adult female indoor tanners. *Am J Health Promot*. 2013; Apr 26. [Epub ahead of print].
40. Russo VA, Van Acker MM, Vander Wal JS, Sinha AA. Patterns of use of sunless tanning product alternatives to indoor tanning among female college students. *JAMA Dermatol*. 2012; 148: 855-857.
41. Guest G, Bunce A, Johnson L. How many interviews are enough? An experiment with data saturation and variability. *Field Methods*. 2006; 18: 59-82.