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Not All Tanners Are Created Equal: Implications of Tanning Subtypes for Skin Cancer Prevention

Sherry L. Pagoto, Ph.D.¹ and Joel Hillhouse, Ph.D.²

¹University of Massachusetts Medical School

²East Tennessee State University

Recently, the idea that UV-risk behaviors can be characterized by subtypes defined by specific behavioral patterns has emerged in the skin cancer literature.^{1, 2} Further support for this idea is provided by O’Riordan and colleagues³ in this issue, who used latent class analyses to classify Hawaiian beach visitors into subtypes based on their degree of skin cancer risk, sun protection practices, and tanning motivations. The findings of this latest study parallel Pagoto and colleagues study of Chicago beach visitors² which identified four subtypes of beachgoers, three of which were strikingly similar to the ones described by O’Riordan and colleagues, i.e., 1) low risk, sun worshippers, 2) moderate risk, sun worshippers (tan seekers), and 3) high risk, sun burners. The largest subtype in both of these studies, (i.e., the moderate risk, sun worshippers) individuals with a strong desire to tan in spite of skin type conducive to sunburning, elevated perceptions of skin cancer risk, and use of sunscreen with little use of shade or clothing for sun protection, is also the group of greatest concern to physicians because their motivation to tan appears to override their perceived and actual risk for skin cancer.² Overall, more than two-thirds of both beach samples report that they are at the beach with the intention to tan to improve their appearance.

Almost two decades of study have clearly demonstrated that the belief that a tan improves appearance is one of the strongest predictors of UV exposure behaviors,^{4–8} though other factors, most notably social factors,^{9–11} perceived susceptibility to skin aging and skin cancer from UV exposure,^{12, 13} and factors related to relaxation and dependency^{14–17} are also implicated. Of great concern is the fact that the largest and most at-risk group above were both seemingly aware of their skin cancer risk, while at the same time highly motivated to expose themselves to enough UV radiation to acquire a tan they believed would improve their appearance. One implication of this finding is that interventions that focus on promoting sun protection use without simultaneously impacting tanning motivation are likely to be limited in their effect on this concerning group of tanners. What is clearly needed is further understanding of the factors driving the motivation to tan for these individuals. Furthermore, improving our ability to identify and classify individuals who engage in risk behavior will also help researchers to better design and match interventions to the various subtypes within the population.

The media together with peer influences are strong forces that steadily reinforce the value of a tanned appearance.⁵ The social norm for the attractiveness of tanned appearance is

Corresponding Author: Sherry L. Pagoto, Ph.D., University of Massachusetts Medical School, Department of Medicine, Division of Preventive and Behavioral Medicine, 55 Lake Avenue North, Worcester, MA 01655 USA, (508) 856-2092 – telephone, (508) 856-3840 – fax, sherry.pagoto@umassmed.edu.

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difficult to impact given the: 1) long history of this belief in the culture, and 2) the number of tanned media images saturating the public. Despite this, recent studies have begun to focus on appearance-related beliefs in skin cancer prevention interventions with good success.^{18–22} While several of these have attempted to counteract media and peer influenced perceptions of the attractiveness of tanned skin, their success, in terms of impact on tan attitudes, and perceptions of peer and media norms have been variable. Potentially further complicating these efforts is the growing popularity of the sunless spray tanned look among celebrities. For example, celebrity contestants in the popular primetime show *Dancing With the Stars*, routinely use sunless spray tanning before each episode. The increasing popularity of spray tanning, now considered a form of body art by many, may perpetuate the social norms about tanned skin, potentially undermining efforts to promote pale skin as a beauty standard. On the other hand, a vast literature across a wide variety of health behaviors demonstrates that it is possible to simultaneously promote both abstinence-based and harm reduction strategies without reinforcing positive attitudes toward the behavior^{23,24} when that approach also promotes behavioral alternatives.

A number of healthy alternatives are available for individuals motivated to tan. For example, some individuals may choose to forgo tanning as a means of improving appearance, instead concentrating on other methods of appearance enhancement such as clothing that does not require a tan to be complimentary¹⁹ or reallocating tanning funds towards other types of appearance enhancement (e.g., manicure, clothing, cosmetics, etc). Another approach is sunless spray tanning or self-applied sunless products, which create the appearance of a tan but do not carry the UV risk. Given that tanning motivation can be strong, often overriding health risks, and potentially resistant to traditional interventions, promoting alternatives may be helpful to lure sunbathers out of the sun.

Behavioral economics represents a framework for understanding health behavior decisions based on alternatives. This theory has been successfully applied to dietary intake,²⁵ smoking²⁶ and substance abuse.²⁷ It posits that: 1) as the cost (time, money, physical or emotional risks, etc) of engaging in a behavior rises, the rate of behavior declines (e.g., as cigarettes become more expensive, rates of smoking have declined), and 2) as behavioral substitutes become available, the rate of the target behavior also declines, especially if the relative cost of the substitute is less than that of the target behavior (e.g., with the introduction of sugar substitutes into the marketplace, the rising consumption of diet soda is associated with reduced consumption of regular sodas).²⁸ Behavioral economics includes a number of principles that may be helpful for designing effective skin cancer risk change messages. First, delayed outcomes (e.g., long-term health) have less impact on behavior than immediate outcomes (e.g., having tanned skin). Changing behavior requires that the immediate outcomes for not engaging in the behavior or for engaging in alternative behaviors outweigh the immediate outcome of engaging in the behavior. Second, behaviors with highly desired outcomes (e.g., tanned appearance) but limited alternatives are more resistant to change even as the cost rises. For example, despite the current dramatic increases in gas prices, demand remains high. Similarly, if no alternatives exist, rising skin cancer rates might not be accompanied by reduced rates of sunbathing. Finally, non-mutually exclusive behaviors such as UV and sunless tanning can be affected by changing their relative perceived costs. Therefore, as the costs of sunbathing and indoor tanning (e.g., perceived risk for skin cancer, skin damage, burns, etc) accumulate, the use of alternatives such as spray tanning that produce the same outcome with fewer costs should rise. Behavioral economic theory dovetails well with Jaccard's Behavioral Alternative Model²⁹ which emphasizes the importance of promoting positive attitudes toward behavioral alternatives, and this model has been successfully used to impact a large variety of health behaviors including UV risk.^{19, 30}

The identification of tanning subtypes in the above cited studies, by providing more detailed information on individual tanning motivations should improve our ability to identify relevant costs and desired outcomes by type in a way that will improve the saliency and effectiveness of behavioral alternatives. For example, Table 1 shows each outdoor tanning subtype from Pagoto, et al.² along with the main reasons each subtype reported for sunbathing and for not using sunscreen. The vast majority of the *Low-Risk Sun Worshipper* subtype (people who rarely burn and are tanning motivated) and the *Moderate-risk Sun Worshipper* type (people who burn easily and are tanning motivated) report that their belief that a tan is attractive is the primary motivation for sunbathing. For these groups, providing low-cost (in terms of price and lack of negative effects) alternatives such as sunless tanning may prove to be a relevant harm reduction strategy. Simple encouragement of sun protection strategies will probably prove insufficient for these subtypes given that they report their primary reason for not using sunscreen is that it interferes with the tanning process. Here is a case where promoting sun protection as a standalone intervention is likely to fail because it conflicts with other important motivations.

On the other hand, *Sunburner* (people who burn easily, have high risk awareness, and are not tan motivated) and *Indifferent to Tanning* (people who do not burn easily and are not tan motivated) subtypes report both physical appearance and social reasons for sunbathing. They appear to find themselves at the beach as much to spend time with friends as for physical appearance reasons. Spray and self-tanning are likely to appeal less to such subtypes as they would represent less salient alternatives for their beach experience. Instead, interventions that target alternative social activities that do not require UV exposure, as recommended by Danoff-Burg and Mosher,¹⁴ or encouraging sun protection strategies might prove more successful. Turrissi et al.³⁰ have used just this approach with middle-school students with some success.

Tanning subtypes have also been observed among indoor tanners, a group sharing many characteristics with the two “*sun worshipper*” subtypes above. While the beachgoer subtypes were developed based on perceived and actual risks, use of sun protection behaviors and general tanning motivations, Hillhouse et al.¹ developed indoor tanning subtypes based on the patterns of tanning behaviors reported (i.e., event tanners who primarily tan before special events, regular tanners who tan on a frequent regular basis throughout the year, and a mixed type who tan regularly in one or two seasons and event tan during their “offseason”). We believe that combining aspects of these two categorization schemes will produce a multi-dimensional model of intentional tanning behavior that would be useful from a clinical and research standpoint. This new model of intervention urgency is based on the pattern of the tanning behavior (event, regular or mixed), the risk profiles, protection behaviors, tanning source, and tanning motivation. Table 2 represents one potential way these factors might be combined to better reflect the complexity of intentional tanning subtype patterns, the urgency with which intervention is needed, and the characteristics that should be targeted by interventions. The number of features in the High Urgency column determines the priority level for intervening on that risk group. The specific characteristics identified should then guide the development of the intervention message. For example, it is clear that patients in the *high risk, sun worshipper subtype*, who describe their tanning pattern as regular, their desire to be tan high, have a strong tendency to burn, and comprise greater than 40% of the target population (i.e., 49%;²) are a high priority subgroup for targeted interventions. Furthermore, it is apparent that they are using both sunscreen and tanning beds in order to control the tanning experience thus achieving high UV exposure rates. Traditional admonitions to not tan and use sun protection are unlikely to have much effect here. Instead approaches utilizing alternatives that address their motivation are more likely to prove effective. On the other hand, *low risk, sun worshippers*

who are event tanners may be easier to move from tanning toward protective behaviors, but represent a lower priority subtype given it comprises only 13% of the target population.²

Further complicating matters is the growing evidence that mood, dependence and other pathological processes may have a role in some tanning behavior.^{16, 17, 31, 32} Improved mood and sense of relaxation appears to strongly motivate indoor tanning,^{1, 14, 32} and outdoor tanning.¹⁵ Still, the desire to be tan continues to be the strongest predictor of both sunbathing and indoor tanning behaviors, and reducing that desire remains difficult for both clinicians and skin cancer prevention researchers. The development of intentional tanning subtypes that more accurately reflect risk, motivation and behavioral patterns will greatly improve the ability of both the researcher and clinician to understand and treat patients at risk. The effectiveness of skin cancer prevention messages may vary significantly by tanner subtype. For example, Mahler et al.³³ reported a small, but statistically insignificant increase in sun protection behavior in a group of college students that was given self-tanners as an alternative to UV tanning. It is possible that such a simple intervention could have had a more significant impact if it had been targeted at *sun worshipper* subtypes who regularly tan. Empirical studies are needed to determine if individuals will be more responsive to messages tailored to their particular subtype.

Possible recommended messages that could be tailored to each subtype are provided in Table 1. While some overlap exists, more precise messages could be tailored to the motivations of each subtype, which may have the potential to improve message effectiveness for the various subtypes. For example the *sunburner* and *indifferent to tanning* subtypes are likely to report that forgetting and avoiding the hassle of sunscreen use are more important reasons for not using sunscreen than their desire to build a tan. As such, interventions that encourage greater use of shade and protective clothing, as well as provide prompts and reminders to use sunscreen regularly could be effective.

The advantages of the development of a tanning typology will not be fully realized until brief assessments that can accurately classify patients are developed and empirically verified. We believe that O’Riordan’s use of latent class analysis to identify and define their subtypes is an important step in this process. Such assessments together with messages tailored to each subtype will give clinicians a way to identify both those patients in greatest need as well as the most effective messages to deliver to specific patients. Given the time-constraints of the typical patient-provider interaction, such systems may very well maximize the efficiency of delivering UV safety information. Public health skin cancer prevention programs may also benefit from the improved accuracy of risk identification as well as the ability to tailor messages to various tanning subtypes perhaps using interactive online intervention programs.

Although many tanners share the desire to improve appearance from UV exposure, not all tanners are created equal. Tanning subtypes provide insights into tanning motivations and behaviors that are useful for both the clinician and the researcher. Combining these insights with powerful social health behavior models such as behavioral economics and/or the behavioral alternative model allows the researcher and ultimately the clinician to understand the competing costs and benefits of the various options available to tanners in a way that can lead them to better and safer decisions about skin health.

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Table 1

Message recommendation by tanning subtype

Tanning Subtype	Reason for Sunbathing	Reason for <u>Not</u> Using Sunscreen	Possible Message Recommendation
Low-Risk Sun Worshipper	"I look better with a tan"	"It slows my tanning"	Safe tanning alternative such as spray-on tanning + Sun protection education
Medium to High Risk Sun Worshipper	"I look better with a tan"	"I forget to bring or put it on" + "It slows my tanning"	Safe tanning alternative such as spray-on tanning + Prompts/Reminders to bring and apply
Low-Risk Sun Indifferent	"To spend time with my friends" + "I look better with a tan"	"I forget to bring or put it on" + "It's too much hassle" + "It slows my tanning"	Social alternatives + Safe tan Alternatives + Sun protection Education
High-Risk Sun Burners	"To spend time with my friends" + "I look better with a tan"	"I forget to bring or put it on"	Social alternatives + Safe tan alternatives + Prompts/Reminders

Table 2

Model of Intervention Urgency by Key Variables Relevant to Indoor and Outdoor Tanners

Variables	HIGH	MEDIUM	LOW
Risk	Burns easily	Sometimes burns	Rarely burns
UV Source	Sun and Artificial	Sun or Artificial	Neither
Protection	Infrequent user	Inconsistent user	Consistent User
Frequency/Pattern	Regular, year round	Seasonal, Event	Rarely or None
Tan Motivation	High	Medium	Low
Representation in target population	40% or greater	10–40%	10% or less