In this month's archives, Naylor and Robinson\(^1\) conclude,

Unfortunately, it seems likely that a significant percentage of the population will continue to ignore our recommendations for minimizing lifetime UV exposure and, worse, that a substantial number will continue to intentionally seek UV exposure for the purpose of cosmetic tanning.

These observations suggest a specific failure of prevention efforts as well as a more general indictment of the inefficacy of behavior change interventions meant to reduce intentional UV exposure. Have our professional prevention efforts been a failure? Are behavior change interventions of little practical use? Before we accept such conclusions, we should first consider that (1) countless individuals have indeed benefited from the skin protection recommendations that dermatologists have delivered, and (2) a number of successful behavioral interventions have been conducted in school, recreational, and occupational settings.\(^2-7\) Still, we cannot deny the increasing rates of skin cancer morbidity and mortality, as well as the increasing popularity of indoor tanning among young people. It is obvious that skin cancer prevention efforts could benefit from theoretically and empirically driven modifications. The assertions of Naylor and Robinson\(^1\) represent an important challenge to alter our conceptualization of the issues and try to use paradigms that provide us with a better understanding of our audience, our message, and the true complexity of the outcome variables we wish to target for change. We present a brief overview of our current knowledge in each of these areas and offer suggestions for alternative, more useful paradigms.

**EXAMINATION OF THE TARGET AUDIENCES**

**Figure 1** and **Figure 2** show the prevalence rates for melanoma and indoor tanning by age group. Although the patterns that emerge suggest that those who have skin cancer are more likely to be older individuals, young people are more likely to engage in risky behaviors, such as indoor tanning. Because of this trend, much of the skin cancer prevention literature has been devoted to describing the behavior of high-risk youth relative to that of others in terms of demographic, general attitudinal, and knowledge variables.\(^10-14\) While knowing such variables is important for helping us target our efforts, they are also among the least easily changed individual characteristics in the context of short-term intervention efforts. Other variables related to these “skin-risky” behaviors, such as cognitions, expectancies, and specific attitudes, have been shown to be more modifiable in short-term interventions in a variety of health behavior contexts.\(^15,16\) We have focused our modeling and intervention efforts on these key variables with some success.

Our approach is based on decision theoretic frameworks in general and on the behavioral alternative model in particular.\(^17\) This model posits that health-related behaviors are best predicted by examining both the behavior in question (eg, sunbathing) and the viable alternative behaviors available to the individual that compete for attention and time (eg, going to a movie, to a friend’s house, to the mall). For example, on a typical hot, sunny summer day, an average young person is faced with an array of activities to choose from, of which sunbathing is just 1 possibility. In this scenario, an effective analysis of intentional tanning behavior would involve a thorough consideration of (1) the factors affecting a decision to suntan and (2) the factors affecting viable behavioral

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**Skin Cancer Risk Behaviors**

*A Conceptual Framework for Complex Behavioral Change*
A perusal of more than 20 Web sites devoted to skin cancer prevention reveals only 3 common recommendations: use sun protection factor 15 sunscreen, wear broad-brimmed hats, and wear sunglasses. In contrast, there is little agreement on the amount of sun exposure that is safe, the times of day to avoid the sun, the number of sunburns that puts one at risk for skin cancer, the best types of clothing for protection, and the use of shade for protection. For example, some Web sites inform the public that a single serious sunburn in childhood can lead to development of melanoma. Two important questions to consider are how such a message will be perceived by individuals who experienced such a childhood sunburn (which is likely to be a large percentage of the people who visit such Web sites), and how they can be expected to act in response. Some people might conclude that if I sunburn is dangerous then future sunburns are even more dangerous. Such a person is likely to try to avoid future serious sunburns. Other people might reason that if they have already had skin damage that will lead to cancer, their future tanning behaviors do not matter. Such a person will be the patient who states, “Whether I get skin cancer or not is out of my hands, therefore I might as well continue to tan and look good.” Last, other individuals might use this information as justification for their use of indoor tanning facilities to develop a base tan that will prevent such “dangerous” burns.

The inconsistency in recommended times to avoid sun exposure (10 AM to 2 PM, 11 AM to 3 PM, or noon to 5 PM) is also potentially harmful. When people receive such mixed messages, some will act conservatively and reduce sun exposure but others will use cognitive strategies to disregard the message entirely (eg, “If they can’t agree on simple facts such as this, they must not know what they are talking about.”). The alternative message often given, “avoid the sun completely,” is so unrealistic that most young people find it easier to avoid or ignore the message and proceed with risky behaviors (eg, tanning) that have powerful social and physical rewards. Consensus on the time of day to avoid the sun is further complicated by regional differences in the United States and elsewhere. For example, in the Big Sky region of the western United States, the sun stays high in the sky until late in the evening in the summer months; thus, many individuals who follow some of the recommendations of these Web sites will still be at significant risk.

Sunscreen use is one of the few consistently recommended behaviors on the Web sites that we checked. Yet, even here the message varies in accuracy and thoroughness. For example, we found inconsistency in such topics as how often to apply and reapply sunscreen, the best amount to apply and method of application, and how to interpret the sun protection factor rating. We know that many of the young people we study believe that constantly reapplying sunscreen allows for unlimited exposure. Furthermore, of Web sites that we surveyed, few thoroughly explained the varying protections offered by different sunscreens for dangerous UV wavelengths. Such lack of information can lead consumers to make purchasing decisions based primarily on price, convenience, and marketing rather than on the real ability of the sunscreen to protect from sunburn, skin damage, and future skin cancer development.

Finally, Web sites only sporadically discuss indoor tanning as a risk factor. This fact, together with the heavy marketing and potentially misleading information being provided by the tanning industry, leaves many young people vulnerable to this health-endangering behavior. For example, an examination of tanning industry Web...
sites and information packets will reveal claims that indoor tanning can prevent cancer by increasing vitamin D production, can prevent early season burning, and can generally reduce stress. The rapidly rising rate of indoor tanning by young people is alarming in this context.

What should we conclude? (1) Our messages need to be clearer, with less room for alternative interpretations that lead to cognitive strategies to avoid or discount the information. (2) We need to strive for message consistency across media sites and within the health delivery community. (3) We need to deliver our messages in a manner that will reach our target audience. (4) Our messages need to focus on the perceived alternative behaviors as well as the health behaviors of interest as discussed in the previous section. (5) We need to be aware of campaigns that run counter to our messages being waged by an industry that profits from high rates of intentional UV radiation exposure. Finally, we need to be concerned with the method of message delivery, which we will discuss in the next section.

EXAMINATION OF MESSAGE DELIVERY

Who should deliver the skin cancer prevention messages we wish to convey to our patients and the public? It can be argued that health professionals, such as dermatologists, are in the best position to understand the issues and accurately convey the information needed for proper skin health behaviors. We believe that this position has some merit. However, it is abundantly clear to health professionals that only some of their patients listen to, understand, and act on their skin health messages. Unfortunately, we must admit that this is a smaller percentage of our patients than we would like. Physicians placed in such a losing position are likely to end up feeling frustrated, angry, and cynical at the inefficacy of behavior change interventions to reduce intentional UV exposure. Is it the most efficacious use of physicians’ time and efforts to continue to scold and lecture unresponsive individuals? We think not. The prevention literature routinely indicates that people do not like to be told what to do and also that non-judgmental clinical interventions have higher efficacy rates in changing health risk behaviors.26

We have evidence6,10,27 that in many situations and with a number of individuals, other message deliverers, such as parents and peers, can be more effective at leading young people to reduce skin-harming behaviors. Parent-based interventions have proved efficacious for improving sun safety behaviors in middle school children6 as well as in other health behavior contexts. Recently, considerable evidence6,10,27,28 has emerged in support of low-cost, brief, peer-mediated approaches to reduce high-risk behaviors in late-adolescent and college student populations. Peer counseling is a common approach to health promotion and has generally been regarded as an effective strategy for academic counseling centers, human immunodeficiency virus education, eating disorders, sexual assault prevention, and alcohol and drug education.27-30 This research indicates that trained peer counselors may be equal to or more effective than professional health care providers in implementing these interventions with youth. Generally, to train educational professionals and students on how to deliver such interventions, a professional peer trainer is required. However, such peer counseling training sessions are becoming more common in primary care offices, health centers, and community centers, and on university campuses.

EXAMINATION OF THE OUTCOMES

Would it be ideal to eliminate all intentional tanning and unprotected outdoor sun exposure? Should all individuals who are at risk wear hats and sunscreen every time they go outside? We would answer unequivocally, yes. However, are these goals attainable? From a public health standpoint, could we actually achieve lower skin cancer morbidity and mortality rates by adopting more realistic and attainable goals? All dermatologists have had patients who continue to place themselves in harm’s way by sunbathing and indoor tanning despite having already experienced the most serious feared consequence—skin cancer. What does this tell us?

Examination of the literature2-7,10,14,16,18,25 reveals a common set of desired behavioral outcomes, including reducing sunbathing, sunburn, and indoor tanning frequencies, while increasing the frequency of sunscreen use; wearing protective clothing; seeking shade; and avoiding the sun during peak periods. The beliefs and attitudes related to the idea that stands in the way of these desired behavioral outcomes—namely, the idea that a tanned body is more attractive and sexually appealing—are pervasive, persistent, and strongly rewarded behaviors imbedded in the social fabric of our culture. Given this fact, we believe that it would be more prudent and successful to examine skin cancer prevention from a harm reduction viewpoint. This paradigm adopts the ultimate goal of eliminating risky health behaviors but viewing even partial steps toward this goal as successes as long as they achieve a degree of lower risk. It is also critical when thinking about the desired outcomes that we have a better understanding of the dynamics of the behaviors we are trying to change. For example, we have evidence32 (also J. J. Hillhouse, PhD, J. Stapleton, BS, and R. Turrisi, PhD, unpublished data, 2005) that a subset of “hard-core” intentional tanners (those who tan ≥100 times per year) have seasonal affective disorder and show some addictive tendencies in their tanning behaviors (as also discussed in the article by Warthan et al31 in this issue).

We would expect different outcomes for these tanners than for average tanners (those who tan indoors ≤25 times per year). Our goals for tanners with seasonal addictive disorder might be to refer them for professional treatment, which might lead to reductions in their tanning behaviors. “Addicted” tanners who visit indoor tanning booths more than 100 times per year might require outcomes designed to reduce the immediate dangers of such obsessive tanning before consideration of the more long-term health effects. In contrast, those who tan for primarily cosmetic reasons may be more likely to respond to recommendations to use self-tanning or bronzing products instead of tanning via the sun and UV radiation lamps.

Finally, we need to more carefully consider the clinical trial phases of the preventative interventions we conduct in the field. Few interventions have gone through all of the various phases, from formal evaluation (phase 1, feasibility and pilot testing) to efficacy (phase 2, random-
ized control) to effectiveness (phase 3, implementation) to impact and dissemination (phase 4, evaluation). Although there are exceptions, few etiological studies have been conducted prior to most preventative interventions in the skin cancer prevention field. Even fewer studies have been conducted at the phase 1 level that would provide good evidence to support a phase 2 efficacy trial. Our field would greatly benefit from a more systematic approach and from the partnering of clinical practitioners and behavioral scientists to develop efficacious skin cancer prevention interventions in the future.

CONCLUSIONS

Where does all this leave the field of skin cancer prevention? With a few notable exceptions, most work in the field of prevention of skin cancer has been either atheoretical or limited to only a subset of constructs in the model we have discussed. It is not surprising that prevention efforts so far have not been generally efficacious. It is also not surprising that much of the hard work and effort by dermatologists and other health care workers in the absence of empirical approach–based guiding frameworks have also proved to be less than satisfying. It is not for lack of motivation or effort. The skin cancer prevention field is still quite young, and there is much promise in the increasing number of researchers who are turning their attention to the topic. However, we believe that an alternate paradigm is called for in the field. Such a paradigm would merge the unique experiences of the medical practitioners who bring a wealth of clinical knowledge to the table, behavioral scientists who are geared toward designing efficacious prevention-oriented behavioral interventions, public health practitioners, and experts in health communications and social marketing. One critical fact we have learned in the past 20 years of prevention work is that seemingly simple behaviors are really quite complex in terms of motivation, decision making, and environmental context. Simple solutions and recommendations will work for only a limited number of our patients and the public. In contrast, some simple solutions can actually have the unintended consequence of making it more difficult to change the behaviors of some individuals in the long run. We believe that the time is right for a paradigm shift in this field toward a more theoretical and empirical approach that attempts to maximize “skin-risky” behavior change in our patients and the general population.

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