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Correlates of Intentional Tanning Among Adolescents in the United States: A Systematic Review of the Literature

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Abstract

Purpose—Exposure to ultraviolet radiation and a history of sunburn in childhood contribute to risk of skin cancer in adolescence and in adulthood, but many adolescents continue to seek a tan, either from the sun or from tanning beds (i.e., intentional tanning). To understand tanning behavior among adolescents, we conducted a systematic review of the literature to identify correlates of intentional tanning in the United States.

Methods—We included articles on original research published in English between January 1, 2001, and October 31, 2011, that used self-reported data on intentional tanning by U.S. adolescents aged 8 to 18 years and examined potential correlates of tanning behaviors. Thirteen articles met our criteria; all used cross-sectional survey data and quantitative methods to assess correlates of intentional tanning.

Results—Results indicate that multiple factors influence tanning among adolescents. Individual factors that correlated with intentional tanning include demographic factors (female sex, older age), attitudes (preferring tanned skin), and behaviors (participating in other risky or appearance-focused behaviors such as dieting). Social factors correlated with intentional tanning include parental influence (having a parent who tans or permits tanning) and peer influence (having friends who tan). Only four studies examined broad contextual factors such as indoor tanning laws and geographic characteristics; they found that proximity to tanning facilities and geographic characteristics (living in the Midwest or South, living in a low ultraviolet area, and attending a rural high school) are associated with intentional tanning.

Conclusions—These findings inform future public health research and intervention efforts to reduce intentional tanning.

Keywords

Intentional tanning; Indoor tanning; Sunbathing; Youth; Adolescents; United States

Both nonmelanoma and melanoma skin cancers are important public health problems and an economic burden on the United States [1–3]. Incidence rates for melanoma and

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nonmelanoma skin cancers have increased in recent years, as have melanoma mortality rates among those age 65 years or older [1,3]. Additionally, melanoma, the deadliest form of skin cancer, is one of the most commonly diagnosed cancers among adolescents and young adults [4,5]. Exposure to ultraviolet radiation (UVR) (from both the sun and indoor tanning devices) and a history of sunburn during childhood and adolescence contribute to one's risk of skin cancer later in adolescence and in adulthood [6–11]. In addition, the greater risk for skin cancer has been observed for those who start tanning at younger ages [8,9,12]. Recent evidence suggests this observation is likely due to increased cumulative exposure over the lifespan [10].

Given the strength of the evidence linking UVR exposure to risk of skin cancer, many public health programs and interventions have been developed in an effort to increase sun-protective behaviors and decrease sunburn, particularly among children and adolescents [13]. However, national surveillance data suggest that less than 40% of high school students in the United States practice sun protection, and 69% report having been sunburned during the summer before they were surveyed [14]. In addition, in 2009, 15.6% of U.S. high school students reported indoor tanning during the previous 12 months [15].

Cultural shifts in the past century have led to a social preference for tanning and having tanned skin, and these social norms are a major challenge to sun protection and skin cancer prevention efforts [16]. In recent years, the media have given increasing attention to the importance of sun protection, particularly the use of sunscreen, but the perceived benefits of having a tan (e.g., looking healthy, attractive, sexy, thin, rich) are also reinforced by the media and popular culture [17,18]. In addition, the indoor tanning industry has promoted tanning as beneficial not only to one's appearance, but also to one's health and mental well-being [19–21]. Some have likened the indoor tanning industry's marketing strategies to those used by tobacco companies: mitigating health concerns, appealing to a sense of social acceptance, emphasizing the psychotropic effects, and targeting specific segments of the population such as adolescent girls and young women [20]. Research suggests that most adolescents, particularly those who are white, believe that they look better and feel healthier with a tan [22]. There is also evidence to suggest that tanning can be addictive, particularly when begun at an early age [19,23–27]. Two recent literature reviews examined the evidence on indoor tanning correlates but did not distinguish barriers specific to U.S. adolescents or address correlates of tanning outdoors in the sun [28,29]. In addition, a review published in 2006 by Olson and Starr reviewed the challenges of intentional tanning in teen and young adults but did not systematically review the evidence on correlates of intentional tanning among this age group and is in need of updating because many newer studies have since been published [30]. To further understand tanning behavior among adolescents and to inform future research and interventions, we systematically reviewed the recent literature on factors correlated with intentional tanning (both indoor and outdoor) among preadolescents and adolescents (ages 8–18 years) in the United States.

Methods

For the purposes of this review, we defined intentional tanning as intentional exposure to UVR, either from an indoor tanning device or from the sun, for the purpose of getting a tan.

We searched PubMed (Medline) and PsychInfo for articles published in English between January 1, 2001, and October 31, 2011, using the following search terms: tanning, intentional tan, indoor tan, UV-tan, UV tan, tanning bed, sunlamp, tanning salon, sun, sunbed, sunbath*, sun bath*, sun-bath*, tan-seek*, tan seek*, ultraviolet (UV), and UVR (the acronym for UV radiation). The titles and abstracts of the articles found through each search were reviewed to identify those that potentially fit within the scope of the review. The full texts of original research articles were reviewed to make a final determination of whether they met the inclusion criteria (described in the following section) to be included in the final review. The reference lists of relevant meta-analyses, editorials, commentaries, and review articles were also searched to identify any additional original research articles that fit within the scope of our review. Figure 1 shows the database search and article selection process.

The final review was limited to original research articles written in English that present self-reported data on correlates of intentional tanning among adolescents aged 8 through 18 years residing in the United States. Review articles, meta-analyses, editorials, and commentaries on intentional tanning were excluded from our review, but relevant original research articles found in their reference lists were not. This review focuses on preadolescents and adolescents residing in the United States, so we did not include studies that reported on non-U.S. populations or adult populations only. We excluded articles that only reported correlates of behavioral intentions (e.g., intention to tan) rather than actual behavior (e.g., self-reported tanning in the past 12 months). We also excluded studies from the final review if they used a sample size of fewer than 100 (because of concerns about generalizability) or used data from parental reports of adolescent tanning behavior rather than adolescents' self-reported behavior (because of concerns about the accuracy of parental reports in this context).

We created an abstraction form to summarize key information from each article, including study design and methods, sample size, demographic characteristics of the sample population, and study results regarding correlates of intentional tanning. Only statistically significant correlates are included in the table and results. Both authors reviewed each of the articles, and any discrepancies regarding article inclusion or the abstracted information were discussed until we arrived at a consensus. After abstracting key information from all relevant articles, we organized the study findings using the “Action Model to Achieve Healthy People 2020 Overarching Goals” as a guide [31]. The action model uses an ecological framework that illustrates that behavior is influenced by interacting factors at multiple levels. We summarized study findings by the following factors: individual factors (demographic characteristics, knowledge, attitudes, and behaviors); social factors (parental influence and peer influence); and contextual factors (geographic characteristics and legislation pertaining to indoor tanning).

Results

Fourteen original research articles were included in the final review. All 14 studies used cross-sectional survey data and quantitative methods to assess correlates of intentional tanning among adolescents. Table 1 contains details of each reviewed study's sample size,

demographic characteristics (age, sex, and race/ethnicity or sun sensitivity) of participants, outcomes of interest, and the correlates of intentional tanning identified as statistically significant by each study. Most studies had near-equal numbers of males and females, and the majority of participants in most studies were non-Hispanic whites. Almost all studies (12 of 14) presented data on adolescent indoor tanning but not outdoor tanning; one study presented data on both indoor tanning and sunbathing among adolescent males [32], and one study reported data on whether participants “try to get a tan” [33]. Twelve studies assessed individual factors related to intentional tanning, and 11 studies assessed social factors. In contrast, only five studies assessed contextual factors related to intentional tanning.

Individual factors

Demographic characteristics—Most studies assessed the relationship between demographic characteristics and intentional tanning. Intentional tanning was frequently and consistently found to be associated with a person’s sex, age, and skin type. Study results indicated that females were more likely than males to try to get tan or to tan indoors [33–41]. In addition, older adolescents were more likely than younger adolescents to report indoor tanning [34–39,41–43]. Several studies examined variables related to race/ethnicity, skin type, or ability to tan. In general, those whose untanned skin was olive or dark, had low sensitivity to the sun, or tanned easily were more likely than those with light, sun-sensitive skin to report indoor tanning [36–39,41,43]. Conversely, two studies that reported low sun sensitivity and ability to tan as being positively associated with indoor tanning also found that non-Hispanic whites were significantly more likely than other racial/ethnic groups to tan indoors [39,41,42].

Knowledge—Two studies found that knowledge about skin cancer was associated with intentional tanning, but the direction of the association was inconsistent. One study found no association between knowledge about skin cancer and previous indoor tanning, but those with more knowledge about skin cancer were less likely to intend to tan indoors in the future [35]. In contrast, another study found that adolescents who believed that indoor tanning can cause skin cancer were more likely to have tanned during the previous year [39]. A third study found that indoor tanning was more likely among those with lower levels of general cognitive ability (unrelated to skin cancer knowledge) [36].

Attitudes—Five studies found that attitudes toward tanning or having tanned skin were associated with intentional tanning. O’ Riordan et al. found that females who reported moderate to strong benefits of tanning and who preferred their skin to be light brown or dark tan (as opposed to its natural color) were more likely to indoor tan [43]. In addition, several studies indicated that adolescents who had a positive attitude toward a tan or believed tans look attractive were more likely than those with a negative attitude to indoor tan [34,37–39,43].

Behaviors—Six studies reported on the association between intentional tanning and other behaviors. Several studies indicated that indoor tanning was associated with other risky behaviors, including tobacco, alcohol, and recreational drug use [35,36,42,43] and poor sun protection behaviors [35,37]. A study of national data on indoor tanning among male high

school students indicated a positive association between indoor tanning and having attempted suicide [42]. Three studies found that those who were attempting weight loss, dieting, or using other methods to control their weight were more likely to report indoor tanning [36,42,43]. Demko et al. found that for females only, routine participation in physical activity and having a high body mass index were associated with reduced odds of indoor tanning, but Myamoto et al. found that among males, having played on at least one sports team was positively associated with indoor tanning [36,42]. One study found that using sunless tanning products was associated with indoor tanning [44]. In addition, O' Riordan et al. found that girls who were trying to "look like the girls or women you see on television, in movies, or in magazines" were more likely to indoor tan [43]. Two studies found that having a personal income or allowance was also a significant predictor of indoor tanning [36,39].

Social factors

Parental influence—Seven studies reported on the association between adolescent tanning, particularly indoor tanning, and parental attitudes and behaviors. Five studies assessed the association between parental permission to indoor tan and teenagers' indoor tanning; each study found that parental permission was consistently the strongest predictor of indoor tanning by teenagers [34,35,39,41,45]. Studies also consistently found that adolescents with a parent who indoor tanned or who believed that people look more attractive with a tan were more likely to indoor tan themselves [34,37,39,41,45]. Adolescents with parents who had concerns about tanning were less likely to tan indoors [39,45]. Conversely, Hoerster et al. found that adolescents whose parents believed indoor tanning could cause cancer were more likely to indoor tan [41].

Peer influence—Six studies assessed peers' influence on adolescents' tanning. Perceived social norms regarding tanning and tanned skin were significantly associated with teenagers' tanning. For example, several studies found that having peers who were tan, who like to be tan, or who tan indoors was positively associated with indoor tanning [35,38,39,41,43]. Lazovich et al. also found that adolescents' perception of the percentage of adults who tan indoors was positively associated with their own indoor tanning [35]. O' Riordan et al. found that frequent indoor tanning was associated with having friends who placed importance on being thin [43]. A study of males aged 11 to 19 found that peer influence was associated with both sunbathing and indoor tanning but was not associated with perceived risk of these behaviors [32].

Broad contextual factors

Five studies examined contextual factors in relation to intentional tanning (specifically indoor tanning), but the contextual factors assessed varied across studies. Mayer et al. assessed the most contextual factors, including the number and density of indoor tanning facilities within the city of residence; proximity of residence to an indoor tanning facility; and the presence, stringency, and levels of compliance with and enforcement of state laws related to indoor tanning [39]. The final multivariate analyses for this study showed that proximity to a tanning facility was the only contextual factor that was significantly associated with adolescent indoor tanning: results indicate that adolescents who live within 2

miles of at least one indoor tanning facility were 40% more likely to have tanned indoors than were those without a facility within 2 miles [39]. Cokkinides et al. also assessed the association between state legislation related to minors' access to indoor tanning facilities and teenagers' indoor tanning behavior; they found no significant association [34]. Three studies assessed the association between geographic characteristics and indoor tanning. Miyamoto et al. found no association between geographic region and indoor tanning among high school males [42]. However Demko et al. found that teenagers residing in the Midwest or South census regions and teenagers attending high school in rural areas were significantly more likely to tan indoors than were teenagers living in other regions or attending schools in suburban or urban areas [36]. O' Riordan et al. found that females living in low UV areas were more likely to tan indoors than were those living in high UV areas [43].

Discussion

Overall, we found that intentional tanning (particularly indoor tanning) among adolescents is likely to be influenced by individual, social, and contextual factors. At the individual level, girls tend to be more likely than boys to report tanning. Intentional tanning was also related to having a positive attitude about a tanned appearance, using sunless tanners, dieting, and trying to look like celebrities—all of which suggest that concern with one's appearance plays an important role in tanning. This finding is consistent with the findings of previous studies that suggest adolescent girls are more likely than boys to heed and internalize messages from the media and from peers about appearance, and women are significantly more dissatisfied than men with their bodies from adolescence through adulthood [46,47]. However, the finding that indoor tanning among high school males is associated with nonprescription steroid drug use and unhealthy weight control practices indicates that appearance likely also plays a role in the tanning behaviors of adolescent males. The association of tanning, specifically indoor tanning, with being an older adolescent may be attributable to the growing independence that often comes with age. As teenagers reach the legal driving age, have access to their own money, and transition from childhood to near-adulthood, they are more likely to be able to patronize indoor tanning facilities on their own. The association of intentional tanning with other unhealthy behaviors such as tobacco, alcohol, recreational drug use, and even attempted suicide may reflect the tendency for risky behaviors to be related to certain psychological characteristics, such as sensation seeking, low self-esteem, or depression [48]. Adolescence is also well-recognized as a phase marked by increasing engagement in risky health-related behaviors, and social and cultural factors are often cited as driving these risky behaviors [49–51]. Behaviors started during adolescence have the potential to become well-established patterns of behavior in adulthood and may have an important effect on adult health [49,50], making adolescence a particularly important time for targeted public health interventions. We found no evidence to suggest that knowledge of the health risks associated with tanning is associated with actual tanning. A literature review conducted by Dodd et al. found that appearance-based messages are more effective for reducing intentional tanning than health-based messages [52]. These findings suggest that educational programs about the hazards of tanning may be ineffective for adolescents if focused solely on health effects.

Although the attitudes, behaviors, and social norms of parents and peers appear to influence adolescent tanning, we found that parental permission is the strongest predictor of indoor tanning. This finding contrasts with other studies that suggest peers are the single biggest social factor in predicting adolescent health-related behavior [53]. Teenagers often rely on parents for transportation to tanning facilities, for money to pay for indoor tanning, or both. In addition, parental permission may be perceived as an indication that indoor tanning is safe, is a social norm, or is even encouraged. Additional research is needed to examine parents' awareness of their children's tanning behaviors and the health risks associated with tanning.

Social norms among peers that promote tanning and having a tanned appearance may further motivate adolescents to tan. Based on the current research, it is unclear how early social norms promoting tanned skin begin to emerge among children, but based on the findings from the study by Rouhani et al., some children may be trying to get a tan as early as third grade [33]. More research is needed to understand the age when appearance motives to tan begin to emerge and to identify effective strategies to reduce the appeal of tanning to youths and counter the social norms that encourage tanning behaviors. Given that tanning behaviors and motivations may vary greatly among indoor tanners and sunbathers, research is also needed to better understand how to effectively address the individual motives to tan [54].

Legislation targeting indoor tanning among minors may be one strategy to consider for reducing such tanning, given the success of policies that target other unhealthy behaviors among adolescents (e.g., tobacco use) [55–57]. However, this review did not find evidence to suggest that state laws on indoor tanning affect adolescents' tanning behaviors. The lack of association between indoor tanning and indoor tanning laws is probably attributable to a number of factors. First, few studies measured the effects of, or reported on, indoor tanning laws. Second, some indoor tanning laws are age-based and ban indoor tanning only for the youngest adolescents, meaning that these laws might not have much effect on the behavior of older adolescents [58]. This could also partially explain the increase in rates of indoor tanning as adolescents increase in age. Third, the effect of indoor tanning legislation is difficult to evaluate accurately because legislation varies by state, as do stringency, enforcement, and compliance. Although the national Youth Risk Behavior Survey (YRBS) includes a question about indoor tanning, the sample design does not allow for state-level estimates, and many state YRBS questionnaires do not include a question about indoor tanning [15,59]. Inclusion of indoor tanning questions on YRBS for all states could increase the ability to measure the impact of legislation on indoor tanning behavior.

This review has some limitations. First, all studies included in the review rely on cross-sectional, self-reported data that may be subject to reporting and recall bias. In addition, cross-sectional data on adolescent health behaviors does not differentiate between experimental behaviors (which are common during youth) and behaviors that will become well-established and continue into early adulthood. Second, although we excluded studies with sample sizes of less than 100, some studies still had relatively small sample sizes, possibly limiting the generalizability of their findings. Even with the small sample sizes, most findings were consistent across several studies. Third, few studies examined indoor

tanning policies or other contextual factors, so we could not draw strong conclusions about these factors as potential targets for intervention.

Despite their limitations, however, the findings of this review can inform future public health research and interventions. This review is the first of its kind to specifically focus on the intentional tanning behaviors of U.S. preadolescents and adolescents while systematically reviewing the current evidence on correlates of both indoor and outdoor tanning behaviors. The findings of this review could potentially inform both future intervention efforts and the development of new studies address the research gaps we identified.

Efforts to intervene at the individual and social levels may be most effective when they include components directed at parents, given their important role in whether adolescents tan indoors. In addition, adolescent tanners' concerns about their appearance and the success of other appearance-based interventions suggest that highlighting the risk of premature aging may be more effective than focusing solely on skin cancer risk. More research on the emergence of social norms that promote tanning and tanned skin as well as parents' awareness of their children's tanning behaviors and the risks associated with tanning could further inform future intervention efforts. The successes of policy-level interventions targeting other health behaviors suggest that legislation may be effective in reducing indoor tanning, but more research is needed at the national, state, and local levels to determine the most effective policy strategies. Improved and ongoing surveillance of indoor tanning among adolescents is needed to enable researchers and policymakers to accurately evaluate the effect of legislation on tanning behavior. Overall, public health programs and policies are needed to create physical and social environments that facilitate and encourage embracing one's natural skin color and protecting one's skin from overexposure to UVR.

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IMPLICATIONS AND CONTRIBUTION

This systematic review indicates that individual factors (sex, age, skin type), social factors (parental influence, peer influence), and broad contextual factors (proximity to tanning facilities, geographic characteristics) are correlated with intentional tanning among adolescents. These findings can inform public health research and interventions to reduce tanning among adolescents.

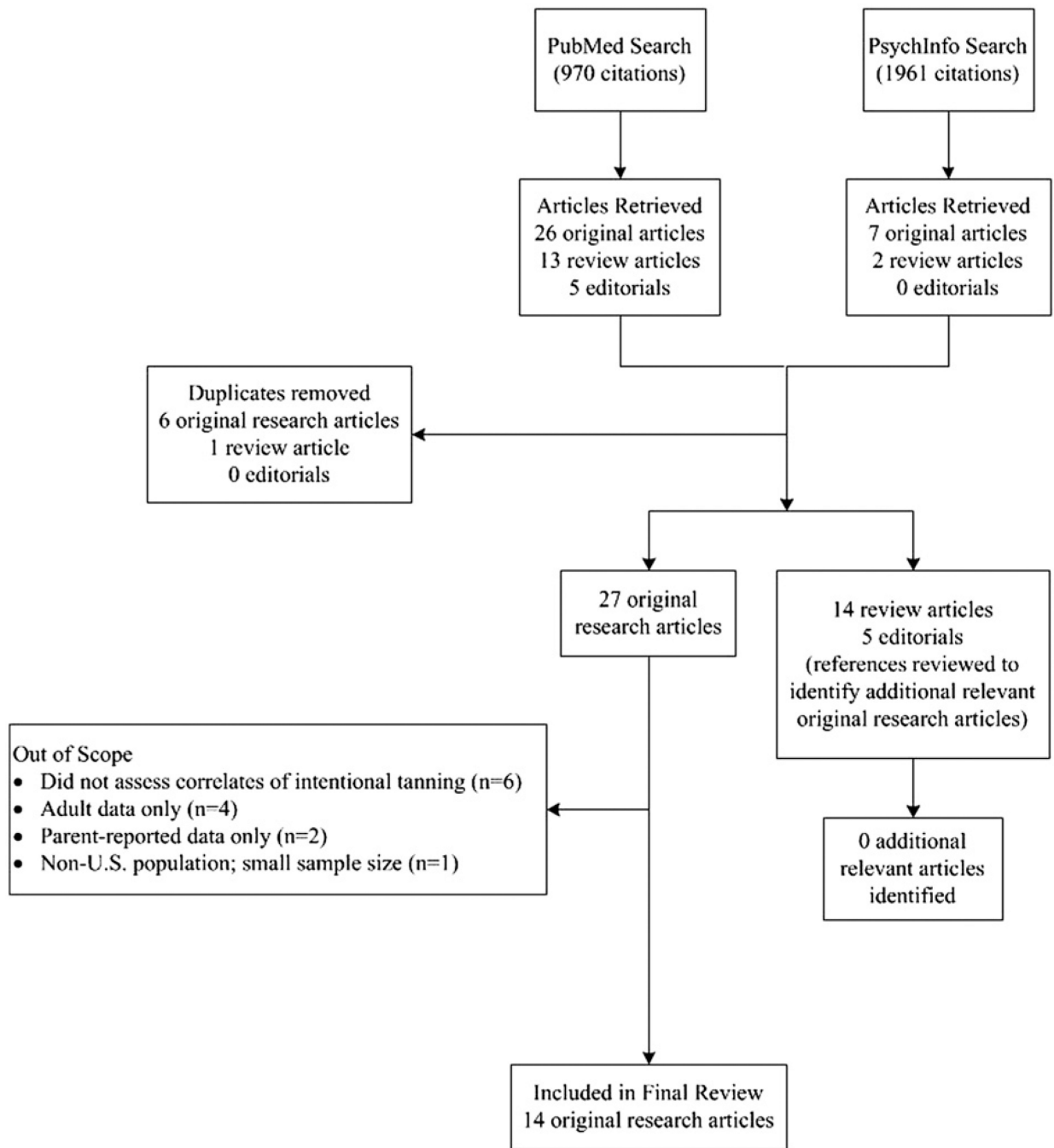


Figure 1. Database search and article selection process: review of the literature on correlates of intentional tanning among adolescents.

Table 1

Summary of 14 studies included in a review of research on correlates of intentional tanning among adolescents^a

Author, year	Characteristics of sample	Race/ethnicity or sun sensitivity	Significant correlates ^b
Cokkinides et al., 2010 [44]	1,600 parent-teen pairs participating in Sun Survey II. Teens age 11–18; 48% female.	86.8% non-Hispanic white 13.2% multiracial	Use of sunless tanning products
Cokkinides et al., 2009 [34]	1,196 parent-teen pairs participating in Sun Survey I. Teens aged 11–18 years; 49.3% female. 1,613 parent-teen pairs, Sun Survey II. Teens age 11–18 years; 48.6% female.	1998: 78.2% white; 21.8% other races 2004: 77.4% white; 22.6% other races	Older age Female sex Positive attitudes toward a tan Parent indoor tanning bed use Parental permission to indoor tan
Cokkinides et al., 2002 [37]	1,192 parent-teen pairs participating in Sun Survey I. Teens aged 11–18 years; Males and females. ^c	Not specified	Older age Female sex Lower sun sensitivity Positive attitudes toward a tan Poor sun protection behaviors Parent indoor tanning bed use
Demko et al., 2003 [36]	6,903 adolescents aged 13–19 participating in the National Longitudinal Study of Adolescent Health Study (Add Health), Wave II. 51.4% female.	100% non-Hispanic white	Older age Female sex Tanning ability Lower cognitive ability Perceiving self as more physically mature than peers Lower body mass Index Less frequent physical activity Substance use (at least 2 of the following: tobacco, alcohol, marijuana) Attempting weight loss Having a personal income or allowance College-degreed mother Attending high school in a non-urban locale Residing in the Midwest or South
Geller et al., 2002 [38]	10,079 adolescents age 13–18 years participating in the Growing Up Today Study (GUTS). Offspring of women in the Nurses' Health Study II. 59.0% female.	100% white	Older age Female sex Olive or dark complexion Positive attitudes toward a tan Having friends who tan
Hoerster et al., 2007 [41]	5,274 parent-teen pairs participating in the Correlates of Indoor Tanning in Youth (CITY 100) study. Teens aged 14–17 years; 52.8% female.	11.1% skin type I 18.8% skin type II 33.1% skin type III 37.0% skin type IV	Older age Female sex Skin type (tans easily) Race/ethnicity (non-Hispanic white) Older parents Parent indoor tanning bed use Parental positive attitudes toward a tan and/or tanning Parental permission to indoor tan Parent agrees that indoor tanning could cause skin cancer Having friends who like to be tan Having friends who tan
LaBat et al., 2005 [40] ^a	386 adolescents aged 12–18 years participating in the Minnesota Sun Smart Program. 52.3% female.	Not specified	Female sex
Lazovich et al., 2004 [35]	1,273 adolescents aged 14–17, identified in a random sample from Boston, MA, and Minneapolis-St Paul MN, metropolitan areas. 62.0% female.	Not specified	Older age Female sex Poor sun protection behaviors Smoking history Parental permission to indoor tan Having friends who like to be tan Having friends who indoor tan

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Author, year	Characteristics of sample	Race/ethnicity or sun sensitivity	Significant correlates ^b
Mayer et al., 2011 [39]	6,125 parent-teen pairs identified in the Correlates of Indoor Tanning in Youth (CITY 100) study. Teens aged 14–17 years; 51.6% female.	69.0% non-Hispanic white 7.5% non-Hispanic black 4.6% Hispanic white 18.9% other	Higher perceived percentage of adults who have indoor tanned Older age Female sex Race-ethnicity (non-Hispanic white) Lower sun sensitivity Larger allowance Belief that tans look attractive Belief indoor tanning can cause skin cancer Parent indoor tanning bed use Parental permission to indoor tan Lower parental concern about indoor tanning Having friends who indoor tan Residing within 2 miles of 1 tanning facility
Miyamoto et al., 2011 [42]	7,219 male students in grades 9–12 responding to the 2009 Youth Risk Behavior Survey (YRBS).	Not specified	Grade (12th grade compared with lower grades) Race-ethnicity (non-Hispanic white) Ever took steroids without a prescription Unhealthy weight control practices Ate fruit and vegetables 5+ times per day Played on at least 1 sports team Binge drinking Attempted suicide
O’Riordan et al., 2006 [43]	6,373 females aged 12–18 years participating in the Growing Up Today Study (GUTS). Offspring of women in the Nurses’ Health Study II.	Not specified	Older age Olive complexion Positive attitudes toward a tan Binge drinking Cigarette smoking Recreational drug use Use of laxatives and vomiting to control weight Trying to look like females in the media Over concern with weight Dieting to lose weight Having friends who indoor tan Importance of thinness to friends Residing in a low ultraviolet areas
Rouhani et al., 2009 [33] ^a	4,002 third, fourth, and fifth graders aged 8–11 years from 19 Palm Beach County, FL, schools. 48.4% female.	36.0% non-Hispanic white 31.6% Hispanic 19.1% non-Hispanic Black 1.8% Native American 1.8% Asian, Pacific Islander	Female sex
Stryker et al., 2004 [45]	1,284 parent-teen pairs teens participating in the Minnesota and Massachusetts Indoor Tanning Study (MMITS). Teens aged 14–17 years; 61.6% female.	Sun sensitivity (1–12) ^d : mean = 4.8, standard deviation = 1.7	Mother’s indoor tanning bed use Lower maternal concern about indoor tanning behavior Maternal permission to indoor tan Higher peer informative influence ^e
Yoo, 2009 [32] ^a	155 male public school students aged 11–18.	92.6% Caucasian 2.0% Hispanic 0.7% African American 4.7% other	Higher peer informative influence ^e

^aExcept for Rouhani et al. [33] and Yoo et al. [32], all studies had 1 outcome of interest: indoor tanning. Yoo et al. had sunbathing and indoor tanning as outcomes of interest; Rouhani et al. have “trying to get a tan” as the outcome of interest. LaBat et al. [40] had “indoor tanning” as an outcome of interest, but not as the primary outcome of interest.

^bFactors significantly correlated with the outcome of interest in final analyses.

^cDistribution not specified.

^dThe higher the score, the great the sensitivity to sun.

^ePeer influence results from conversations about appearance and criticism from friends.