Published in final edited form as:

Am J Prev Med. 2017 October ; 53(4): 473–480. doi:10.1016/j.amepre.2017.03.011.

Parental Support for Age-based Indoor Tanning Restrictions

Melissa B. Gilkey, PhD^{1,2}, Darren Mays, PhD, MPH^{3,4}, Maryam M. Asgari, MD, MPH^{1,2,5},
Melanie L. Kornides, ScD^{1,2}, and Annie-Laurie McRee, DrPH⁶

¹Department of Population Medicine, Harvard Medical School, Boston, Massachusetts

²Harvard Pilgrim Health Care Institute, Boston, Massachusetts

³Department of Oncology, Georgetown University Medical Center, Washington, District of Columbia

⁴Cancer Prevention and Control Program, Lombardi Comprehensive Cancer Center, Washington, District of Columbia

⁵Department of Dermatology, Massachusetts General Hospital, Boston, Massachusetts

⁶Department of Pediatrics, University of Minnesota, Minneapolis, Minnesota

Abstract

Introduction—Regulatory agencies, including the U.S. Food and Drug Administration, are considering policies to ban indoor tanning for youth aged <18 years. Using data from a nationally representative sample, this study assessed parental support for age-based bans as well as less restrictive parental permission requirements.

Methods—Data came from an online survey completed by 1,244 parents of adolescents aged 11–17 years. Weighted multivariable logistic regression models assessed correlates of supporting an indoor tanning ban for youth aged <18 years. Data collection and analysis occurred in 2016.

Results—Almost two thirds (65%) of parents agreed with indoor tanning bans for youth, with smaller proportions having no opinion (23%) or disagreeing (12%). Support for bans increased with greater perceived harms of indoor tanning for adolescents (OR=2.66, 95% CI=1.97, 3.59) and decreased with greater perceived benefits (OR=0.49, 95% CI=0.36, 0.67). Compared with support for bans, support for parental permission requirements was somewhat higher, with 79% of parents agreeing with the policy. Most parents (60%) agreed with both policies; only 4% disagreed with both.

Conclusions—Age-based indoor tanning restrictions, including bans, engender broad-based support among parents. Communicating the harms of indoor tanning may facilitate the implementation of these policies.

Address correspondence to: Melissa B. Gilkey, PhD, Department of Population Medicine, Harvard Medical School, 401 Park Drive, Suite 401 East, Boston MA 02215. melissa_gilkey@hphc.org.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

No financial disclosures were reported by the authors of this paper.

INTRODUCTION

Indoor tanning is common among U.S. adolescents, and carries serious public health consequences.^{1,2} In 2013, an estimated 1.9 million high school students had used an indoor tanning device in the last 12 months, with the prevalence of use reaching 31% among female, non-Hispanic white students.¹ This level of preventable ultraviolet exposure is concerning given that indoor tanning is associated with an increased risk of skin cancer, and is especially harmful for those who begin use early in life.^{2–4} For example, indoor tanning is associated with a 67% increase in overall risk of cutaneous squamous cell carcinoma, a common form of skin cancer, but a 102% increase in risk for those who begin indoor tanning before age 25 years.² Similarly, associations between indoor tanning and provider-reported diagnoses of malignant melanoma are strongest among younger women.³ Accumulating evidence of indoor tanning harms has prompted public health leaders, including WHO and the U.S. DHHS, to categorize ultraviolet radiation as a carcinogen and prioritize the goal of reducing adolescents' use.^{5,6} These efforts are likely to be spurred by a recent economic analysis, which estimates that a 29% reduction in indoor tanning before adulthood could prevent more than 60,000 future melanoma cases and 6,700 future melanoma deaths among today's cohort of adolescents aged 14 years.⁷

Policies restricting youth access to indoor tanning, such as banning access for those under a minimum age, are an especially promising approach to prevention.⁸ In the U.S., 13 states and the District of Columbia have banned indoor tanning for youth aged <18 years, while an additional 12 states have enacted bans at younger ages.⁹ Such age-based restrictions are associated with lower prevalence of indoor tanning at the state level, making them preferable to more-permissive policies such as requiring parental permission for indoor tanning.⁸ Although 17 states currently have parental permission requirements,⁹ research to date suggests such policies have a more limited impact on indoor tanning.^{8,10,11} Weaknesses of these policies are unclear at present, but may include parents' willingness to give permission or lower compliance by indoor tanning facilities with parental permission requirements, compared with age-based bans.^{12–14}

Based on the available evidence, many regulatory agencies in the U.S. and abroad are considering age-based bans on indoor tanning.⁹ Most notably, the U.S. Food and Drug Administration (FDA) issued a proposed rule in 2015 to ban indoor tanning for youth aged <18 years nationally.¹⁵ This rule would replace the patchwork of state-based policies that currently regulate adolescents' access to indoor tanning, but could also elicit reactance from parents if they feel their authority is being unfairly limited by a policy they do not support. Because little is known about parents' views on indoor tanning policies, this study assessed support for age-based indoor tanning restrictions, using data from a nationally representative sample of parents of adolescents aged 11–17 years. By identifying factors associated with support for indoor tanning restrictions, findings can inform the adoption and implementation of such policies so as to engage parents as partners in skin cancer prevention and protect adolescents from a preventable source of ultraviolet exposure.

METHODS

Study Sample

Participants were a nationally representative sample of parents of adolescents who completed an online survey in September 2016. Parents were members of a standing panel of U.S. adults maintained by a survey research company.¹⁶ The company recruits panel members using a probability-based sampling approach that combines list-assisted, random-digit dialing and address-based sampling; this approach provides coverage of households with and without landline telephones.¹⁶ To facilitate the participation of lower-income respondents, the company provides Internet access and an electronic device to panel members who lack these resources; these incentives are provided for ongoing participation in the panel. Panel members with established Internet access instead receive points that they can redeem for small cash payments.

The survey company invited 2,580 parents to complete the survey. A total of 1,523 parents responded by completing an eligibility screener to confirm having an age-eligible child and providing informed consent. Of these, 1,259 met eligibility criteria and completed the survey. The response rate was 59% using the American Association for Public Opinion Research Formula 4.¹⁷ If a parent reported having more than one age-eligible adolescent, the one with the most recent birthday was selected as the index for survey questions. The present analysis excluded respondents who provided inadequate data on key variables ($n=15$), resulting in a final analytic sample of 1,244 parents. Harvard Pilgrim Health Care Institute's IRB approved the study protocol.

Measures

The survey introduced the topic of indoor tanning with the following definition: The next questions are about indoor tanning, which includes the use of sunlamps, sunbeds, or tanning booths. Indoor tanning does not include the use of spray tans, sunless tanning lotions, or bronzers. Parents indicated how often they had used an indoor tanning device in the past 12 months, with responses categorized as not at all or one or more times. Parents also reported how likely they would be to give their adolescent permission to use an indoor tanning device in the next 12 months. Based on validated approaches for assessing cancer-related behavioral intention,^{18,19} parents were categorized according to whether they had any intention to give permission (1=definitely would/probably would/probably would not, 0=definitely would not). Survey items were based on established measures in the literature.^{18,19}

The survey assessed parental attitudes about indoor tanning among adolescents aged <18 years with ten items that used a 5-point response scale (1=strongly disagree, 5=strongly agree).^{10,20–22} Of these items, four assessed perceived harms ($\alpha=0.74$) of indoor tanning for adolescents, including whether tanning can be addictive, harm their health, age their skin, or cause cancer later in life. Six items assessed the perceived benefits ($\alpha=0.83$) of indoor tanning for adolescents in terms of whether tanning can: improve their mood, help them feel more confident about how they look, be a fun thing to do with friends, be safer for skin than natural sunlight, provide protection from burning in the sun later, or be a good way to get

Vitamin D. For each construct, responses were averaged to create summary scores, and then dichotomized into high versus lower agreement.

Next, the survey assessed parents' support for age-based restrictions on indoor tanning.^{23,24} Parents first read a brief informative statement: Public health experts advise against indoor tanning for children under age 18. Indoor tanning poses short-term health risks, such as skin and eye damage. Over time, indoor tanning can also lead to skin cancer. Parents then indicated their level of agreement with two types of indoor tanning restriction, with two items presented in random order: There should be laws to ban children under the age of 18 from indoor tanning (i.e., an indoor tanning ban) and There should be laws requiring parental permission for children under the age of 18 to indoor tan (i.e., parental permission for indoor tanning). Responses were based on a 5-point scale, which was then dichotomized for analysis to assess support for each policy (1=strongly agree/somewhat agree, 0=neither/somewhat disagree/strongly disagree).

Additional items assessed demographic characteristics including the adolescent's sex, age, and race/ethnicity, as well as the parent's sex, educational attainment, household income, and state of residence. In the manner of Guy et al.,^{8,9} data on state of residence were used to further categorize parents according to the type of indoor tanning restrictions currently in place in their state: no restriction, requirement of parental permission or accompaniment, ban for youth aged <18 years, or ban for youth starting at younger ages.

Statistical Analysis

Descriptive statistics were used to characterize parents' attitudes toward indoor tanning and to describe their level of support for indoor tanning restrictions. Separately for each type of restriction, simple logistic regression models assessed bivariate correlates of support. Statistically significant correlates were then entered into multivariable models. Analyses used post-stratification survey weights to generate nationally representative estimates; tables report unweighted frequencies, and weighted percentages, means, and ORs. Analyses were conducted in 2016 using Stata, version 13. Statistical tests were two-tailed with a critical α of 0.05.

RESULTS

Parents reported on similar proportions of adolescents by sex (53% male) and age (mean, 14 years) (Table 1). The racial/ethnic composition of the sample included non-Hispanic white (54%), non-Hispanic black (10%), and Hispanic (24%) adolescents. Adolescents categorized as "other" race (12%) included those whose parents identified them as Asian (n=29), American Indian or Alaska Native (n=6), Native Hawaiian or Pacific Islander (n=3), more than one race (n=61), or none of these (n=8). In terms of socioeconomic indicators, more than one third (38%) of parents reported having a high school degree or less education, and about one fifth (18%) reported their household income as <\$35,000 per year. Respondents resided in 48 states and the District of Columbia.

A majority of parents reported support for indoor tanning bans and parental permission requirements for youth aged <18 years. With regard to indoor tanning bans, about two thirds

of parents “somewhat” or “strongly” agreed with the restriction (65%), about one quarter neither agreed nor disagreed (23%), and the remainder “somewhat” or “strongly” disagreed (12%). By comparison, support for parental permission requirements was higher ($p<0.01$), with more than three quarters of parents agreeing with the restriction (79%) and smaller proportions neither agreeing nor disagreeing (15%), or disagreeing (7%). A majority of parents (60%) indicated support for both indoor tanning bans and parental permission requirements. Very few (4%) disagreed with both restrictions.

In terms of contextual factors, few parents (6%) reported using an indoor tanning device in the past 12 months, and about three quarters (76%) indicated that they “definitely would not” give their own adolescent permission to indoor tan in the next 12 months. On measures of indoor tanning attitudes (Table 2), parents rated the potential harms for adolescents as being moderately high on average (mean, 4.1; $SD=0.7$) and the potential benefits as being moderately low (mean, 2.2; $SD=0.8$). In terms of their state’s regulatory environment, parents resided in states with parental permission requirements (33%), bans for all youth aged <18 years (38%), bans starting at younger ages (24%), or no restrictions (5%).

Table 3 shows correlates of parental support for age-based indoor tanning bans and parental permission requirements. In the multivariable model, parents had higher odds of supporting an indoor tanning ban if they perceived indoor tanning as being highly harmful to adolescents versus less so ($OR=2.66$, 95% $CI=1.97, 3.59$) or if they were reporting on a Hispanic versus non-Hispanic white adolescent ($OR=1.63$, 95% $CI=1.14, 2.35$). Parents had lower odds of supporting a ban if they perceived indoor tanning as having benefits for adolescents ($OR=0.49$, 95% $CI=0.36, 0.67$) or had moderate versus low levels of educational attainment ($OR=0.66$, 95% $CI=0.47, 0.93$). Bivariate correlates that did not retain statistical significance in the multivariable model were adolescent’s age, adolescent’s sex, parent’s sex, parent’s indoor tanning, parent’s willingness to give permission for indoor tanning, and geographic region. Variables not associated with support for bans at the bivariate level were household income and current indoor tanning restrictions in state of residence.

In the multivariable model, parents had higher odds of supporting parental permission requirements if they perceived indoor tanning as being highly harmful to adolescents versus less so ($OR=2.53$, 95% $CI=1.77, 3.62$) (Table 3). Parents had lower odds of supporting parental permission requirements if they perceived indoor tanning as having benefits for adolescents ($OR=0.54$, 95% $CI=0.37, 0.80$), reported having used indoor tanning devices in the last 12 months ($OR=0.54$, 95% $CI=0.32, 0.92$), were willing to give their adolescent permission to indoor tan ($OR=0.68$, 95% $CI=0.47, 0.99$), or were reporting on a non-Hispanic black versus non-Hispanic white adolescent ($OR=0.54$, 95% $CI=0.33, 0.90$). Bivariate correlates that did not retain statistical significance in the multivariable model were parent’s sex and geographic region. Variables not associated with support for parental permission requirements at the bivariate level were adolescent’s sex, adolescent’s age, parent’s educational attainment, household income, and current indoor tanning restrictions in state of residence.

DISCUSSION

Findings from this national survey indicate broad-based support for indoor tanning restrictions among parents of adolescents. In the case of bans for youth aged <18 years, about two thirds of parents agreed with such policies, whereas one quarter had no opinion and 12% disagreed. This finding is consistent with and meaningfully extends previous research demonstrating a similarly high level of support for minimum age restrictions among young adults.^{23,25} Interestingly, parents' support for age-based bans did not vary substantially by geographic region, existing indoor tanning restrictions in parents' state of residence, or the sex or age of their adolescent children. Even among parents who reported having themselves recently used an indoor tanning device, fully half were in support of a ban for youth. In this way, the findings of this study suggest that regulatory agencies can expect age-based indoor tanning bans, such as FDA's recently proposed rule, to be well received by the vast majority of parents nationally. Prior to the enactment of federal regulations, the findings of this study can also inform the adoption of age-based bans at the state and local levels.

In contrast to the limited demographic variation in support for age-based indoor tanning bans, support for such bans was associated with parents' perceptions of indoor tanning as a practice that poses high potential harms and low potential benefits for adolescents. Owing to the study's cross-sectional design, the direction of these relationships cannot be assessed directly. However, health behavior theories, including the Health Belief Model, suggest that communicating the potential harms of indoor tanning and correcting misperceptions about its benefits are important for dissuading indoor tanning behavior^{26,27}; such communication may be similarly important for facilitating the implementation of indoor tanning bans so that parents, including the 23% who have yet to form an opinion, understand the rationale for such policies. Pairing bans with parental outreach and education may serve to engage parents as partners in indoor tanning prevention and reduce the potential for unintended consequences of restrictions, such as a shift in adolescents' indoor tanning use from public facilities to private, in-home settings. Future research is needed to identify clear and compelling ways of communicating information on indoor tanning, particularly given this study's finding that some parents do not perceive a link between indoor tanning and harms such as skin cancer. Prior research indicates messages conveying the potential harms of tanning through text and graphic imagery may be a promising strategy,^{18,28} and additional approaches, including mail- and social media—based interventions to improve parent—adolescent communication about indoor tanning, are currently being evaluated.^{29,30}

Compared with age-based bans, support for less restrictive parental permission requirements was slightly higher, with more than three quarters of parents in the sample agreeing with such policies. As in the case of bans, support for parental permission requirements was correlated with perceiving high harms and low benefits of indoor tanning for adolescents. Additional correlates included parents' intention to withhold permission for indoor tanning as well as parents' own avoidance of indoor tanning behavior. The findings of this study may speak to the inherent limitations of parental permission requirements, given that almost one quarter (24%) of parents in the sample reported some degree of willingness to give their adolescent permission to indoor tan in the next 12 months. This finding, in combination with

evidence of limited effectiveness, suggest parental permission requirements are a less favorable policy approach to indoor tanning prevention, their popularity notwithstanding.^{8,10,14}

Limitations

This study offers novel data on parents' perspectives on indoor tanning restrictions, an active area of public health policymaking at the state, national, and international levels.⁸ Strengths include a relatively large, nationally representative sample of parents of adolescents, including those from households with and without landline telephones. Limitations include a cross-sectional design, which precludes determination of causality. If parents' perceptions of indoor tanning harms lead them to support indoor tanning restrictions, then changing parents' perceptions is a logical way to facilitate the implementation of these and other interventions for indoor tanning prevention. However, it is also possible that perceptions and support for restrictions co-occur in more complex ways, with other factors not measured here, such as perceived societal norms surrounding adolescents' appearance, constituting additional barriers. Another limitation is this study's exclusive focus on parents of adolescents. Although parents are critical partners in skin cancer prevention and a key constituency for public health policymakers, it is important to understand how other stakeholders, including adolescents themselves, perceive and navigate policies meant to limit access to indoor tanning. A final consideration is that the survey provided parents with information, including a definition of indoor tanning and its risks, intended to mirror what they would read when encountering FDA's proposed rule or similar legislation; parents might express a higher or lower level of support for indoor tanning restrictions in the absence of this information.

CONCLUSIONS

Age-based bans on indoor tanning offer FDA and other regulatory agencies an opportunity for skin cancer prevention, but parental support for such policies is critical to maximizing their impact. Findings of this national survey suggest that most parents support banning adolescents from indoor tanning, and that support is particularly strong among parents who are aware of indoor tanning harms. Given evidence that age-based bans appear to be more effective than parental permission requirements in preventing indoor tanning, such bans should be prioritized as means of protecting the nation's youth from a common and preventable carcinogenic exposure.

Acknowledgments

This study was funded by the National Cancer Institute (K22 CA186979 for MG) and the National Institute of Arthritis Musculoskeletal and Skin Diseases (K24 AR069760 for MA). Funders played no role in the design and conduct of the study; collection, management, analysis, and interpretation of data; preparation, review, or approval of the manuscript; or the decision to submit the manuscript for publication.

MG conceived of the study, developed data collection instruments, led the analysis, drafted the manuscript, and approved the final version. DM, MA, MK, and ALM conceived of the study, developed data collection instruments, critically reviewed multiple drafts of the manuscript, and approved the final version.

References

1. Guy GP Jr, Berkowitz Z, Everett Jones S, Holman DM, Garnett E, Watson M. Trends in indoor tanning among U.S. high school students, 2009–2013. *JAMA Dermatol.* 2015; 151(4):448–450. <https://doi.org/10.1001/jamadermatol.2014.4677>. [PubMed: 25535810]
2. 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. <https://doi.org/10.1136/bmj.e5909>. [PubMed: 23033409]
3. Lazovich D, Isaksson Vogel R, Weinstock MA, Nelson HH, Ahmed RL, Berwick M. Association Between Indoor Tanning and Melanoma in Younger Men and Women. *JAMA Dermatol.* 2016; 152(3):268–275. <https://doi.org/10.1001/jamadermatol.2015.2938>. [PubMed: 26818409]
4. Boniol M, Autier P, Boyle P, Gandini S. Cutaneous melanoma attributable to sunbed use: systematic review and meta-analysis. *BMJ.* 2012; 345:e4757. <https://doi.org/10.1136/bmj.e4757>. [PubMed: 22833605]
5. WHO. Artificial tanning sunbeds: risk and guidance. www.who.int/uv/publications/sunbedpubl/en/. Published 2003. Accessed November 18, 2016
6. U.S. DHHS. Healthy People 2020 Objectives — Cancer. www.healthypeople.gov/2020/topics-objectives/topic/cancer/objectives. Published 2014. Accessed November 18, 2016
7. Guy GP Jr, Zhang Y, Ekwueme DU, Rim SH, Watson M. The potential impact of reducing indoor tanning on melanoma prevention and treatment costs in the United States: an economic analysis. *J Am Acad Dermatol.* 2017; 76(2):226–233. <https://doi.org/10.1016/j.jaad.2016.09.029>. [PubMed: 27939556]
8. Guy GP Jr, Berkowitz Z, Jones SE, et al. State indoor tanning laws and adolescent indoor tanning. *Am J Public Health.* 2014; 104(4):e69–74. <https://doi.org/10.2105/AJPH.2013.301850>.
9. National Conference of State Legislatures. Indoor tanning restrictions for minors: a state-by-state comparison. www.ncsl.org/research/health/indoor-tanning-restrictions.aspx. Published 2016. Accessed November 18, 2016
10. Mayer JA, Woodruff SI, Slymen DJ, et al. Adolescents' use of indoor tanning: a large-scale evaluation of psychosocial, environmental, and policy-level correlates. *Am J Public Health.* 2011; 101(5):930–938. <https://doi.org/10.2105/AJPH.2010.300079>. [PubMed: 21421947]
11. Simmons RG, Smith K, Balough M, Friedrichs M. Decrease in self-reported tanning frequency among Utah teens following the passage of Utah Senate Bill 41: an analysis of the effects of youth-access restriction laws on tanning behaviors. *J Skin Cancer.* 2014; 2014:839601. <https://doi.org/10.1155/2014/839601>. [PubMed: 25215240]
12. Grewal SK, Haas AF, Pletcher MJ, Resneck JS Jr. Compliance by California tanning facilities with the nation's first statewide ban on use before the age of 18 years. *J Am Acad Dermatol.* 2013; 69(6):883–889. <https://doi.org/10.1016/j.jaad.2013.09.016>. [PubMed: 24120564]
13. Tripp MK, Gershenwald JE, Davies MA, et al. Assessment of compliance with Texas legislation banning indoor UV tanning by minors. *JAMA Dermatol.* 2017; 153(2):228–229. <https://doi.org/10.1001/jamadermatol.2016.4068>.
14. Culley CA, Mayer JA, Eckhardt L, et al. Compliance with federal and state legislation by indoor tanning facilities in San Diego. *J Am Acad Dermatol.* 2001; 44(1):53–60. <https://doi.org/10.1067/mjd.2001.110063>. [PubMed: 11148477]
15. U.S. Food and Drug Administration. FDA proposes new safety measures for indoor tanning devices: the facts. www.fda.gov/ForConsumers/ConsumerUpdates/ucm350790.htm. Published 2016. Accessed November 18, 2016.
16. GfK. KnowledgePanel Design Summary. [www.knowledgenetworks.com/ganp/docs/KnowledgePanel\(R\)-Design-Summary.pdf](http://www.knowledgenetworks.com/ganp/docs/KnowledgePanel(R)-Design-Summary.pdf). Published 2013. Accessed November 18, 2016
17. American Association for Public Opinion Research Standard definitions. www.aapor.org/AAPOR_Main/media/publications/Standard-Definitions20169theditionfinal.pdf. Published 2016. Accessed November 18, 2016
18. Mays D, Tercyak KP. Framing indoor tanning warning messages to reduce skin cancer risks among young women: implications for research and policy. *Am J Public Health.* 2015; 105(8):e70–76. <https://doi.org/10.2105/AJPH.2015.302665>.

19. Pierce JP1, Choi WS, Gilpin EA, Farkas AJ, Merritt RK. Validation of susceptibility as a predictor of which adolescents take up smoking in the United States. *Health Psychol.* 1996; 15(5):355–361. <https://doi.org/10.1037/0278-6133.15.5.355>. [PubMed: 8891714]
20. Cokkinides V, Weinstock M, Lazovich D, Ward E, Thun M. Indoor tanning use among adolescents in the U.S., 1998 to 2004. *Cancer.* 2009; 115(1):190–198. <https://doi.org/10.1002/cncr.24010>. [PubMed: 19085965]
21. Geller AC, Colditz G, Oliveria S, et al. Use of sunscreen, sunburning rates, and tanning bed use among more than 10 000 U.S. children and adolescents. *Pediatrics.* 2002; 109(6):1009–1014. <https://doi.org/10.1542/peds.109.6.1009>. [PubMed: 12042536]
22. Hoerster KD, Mayer JA, Woodruff SI, Malcarne V, Roesch SC, Clapp E. The influence of parents and peers on adolescent indoor tanning behavior: findings from a multi-city sample. *J Am Acad Dermatol.* 2007; 57(6):990–997. <https://doi.org/10.1016/j.jaad.2007.06.007>. [PubMed: 17658194]
23. Mays D, Murphy SE, Bubly R, Atkins MB, Tercyak KP. Support for indoor tanning policies among young adult women who indoor tan. *Transl Behav Med.* 2016; 6(4):613–621. <https://doi.org/10.1007/s13142-016-0432-6>. [PubMed: 27496162]
24. Calo WA, Gilkey MB, Shah PD, Moss JL, Brewer NT. Parents' support for school-entry requirements for human papillomavirus vaccination: a national study. *Cancer Epidemiol Biomarkers Prev.* 2016; 25(9):1317–1325. <https://doi.org/10.1158/1055-9965.EPI-15-1159>. [PubMed: 27543621]
25. Seidenberg AB, Noar SM, Sontag JM. Support for tanning bed control policies among female university students. *Am J Prev Med.* 2016; 50(4):e121–122. <https://doi.org/10.1016/j.amepre.2015.12.007>. [PubMed: 26810357]
26. Fishbein M. A theory of reasoned action: some applications and implications. *Nebr Symp Motiv.* 1980; 27:65–116. [PubMed: 7242751]
27. Rosenstock IM, Strecher VJ, Becker MH. Social learning theory and the health belief model. *Health Educ Q.* 1988; 15(2):175–183. <https://doi.org/10.1177/109019818801500203>. [PubMed: 3378902]
28. Mays D, Zhao X. The influence of framed messages and self-affirmation on indoor tanning behavioral intentions in 18- to 30-year-old women. *Health Psychol.* 2016; 35(2):123–130. <https://doi.org/10.1037/hea0000253>. [PubMed: 26192383]
29. Pagoto SL, Baker K, Griffith J, et al. Engaging moms on teen indoor tanning through social media: protocol of a randomized controlled trial. *JMIR Res Protoc.* 2016; 5(4):e228. <https://doi.org/10.2196/resprot.6624>. [PubMed: 27899339]
30. Lazovich D, Choi K, Rolnick C, Jackson JM, Forster J, Southwell B. An intervention to decrease adolescent indoor tanning: a multi-method pilot study. *J Adolesc Health.* 2013; 52(5):S76–82. <https://doi.org/10.1016/j.jadohealth.2012.08.009>. [PubMed: 23601614]

Table 1

Sample Characteristics (n=1,244)

Characteristics	n	(%)
Adolescent characteristics		
Sex		
Male	653	(53)
Female	591	(47)
Age (years)		
11–12	334	(26)
13–15	515	(42)
16–17	395	(32)
Race		
Non-Hispanic white	770	(54)
Non-Hispanic black	104	(10)
Hispanic	263	(24)
Other	107	(12)
Parent characteristics		
Sex		
Male	605	(44)
Female	639	(56)
Educational attainment		
High school degree or less	496	(38)
Some college, no degree	327	(28)
College degree or more	421	(34)
Household characteristics		
Annual income		
<\$35,000	258	(18)
\$35,000–\$74,999	351	(28)
\$75,000	635	(54)
Region		
Northeast	219	(17)
Midwest	305	(21)
South	429	(37)
West	291	(25)

Note: Table shows raw frequencies and weighted percentages.

Table 2

Parents' Attitudes Toward Indoor Tanning Among Adolescents (n=1,244)

Attitudes	Mean	(SD)
Perceived harms ($\alpha=0.74$)	4.11	(0.72)
Harms health	4.28	(0.99)
Causes skin to age more quickly	4.27	(0.93)
Causes skin cancer later in life	4.17	(0.95)
Can be addictive	3.71	(0.98)
Perceived benefits ($\alpha=0.83$)	2.22	(0.84)
Helps them feel more confident about looks	2.67	(1.18)
Can be a fun thing to do with friends	2.34	(1.16)
Improves mood	2.30	(1.14)
Good way to get Vitamin D	2.08	(1.07)
Gives protection from burning in the sun	2.04	(1.12)
Is safer for skin than natural sunlight	1.92	(1.09)

Note: Table shows weighted means.

Table 3
Correlates of Parental Support for Indoor Tanning Restrictions for Youth Under Age 18 Years (n=1,244)

Candidate correlates	Support ban				Support parental permission requirement			
	Bivariate		Multivariate		Bivariate		Multivariate	
	n/N	(%)	OR	(95% CI)	n/N	(%)	OR	(95% CI)
Adolescent characteristics								
Sex								
Male	403/653	(61)	1		510/653	(77)	1	
Female	394/591	(69)	1.40	(1.08–1.82)*	479/591	(81)	1.25	(0.92–1.69)
Age (years)								
11–12	227/334	(68)	1		271/334	(80)	1	
13–15	346/515	(69)	1.01	(0.73–1.39)	410/515	(79)	0.92	(0.63–1.35)
16–17	224/395	(57)	0.62	(0.44–0.86)**	308/395	(77)	0.83	(0.56–1.24)
Race								
Non-Hispanic white	485/770	(63)	1		629/770	(81)	1	
Non-Hispanic black	58/104	(54)	0.69	(0.44–1.08)	70/104	(68)	0.49	(0.30–0.79)**
Hispanic	187/263	(73)	1.54	(1.12–2.14)**	205/263	(78)	0.80	(0.55–1.15)
Other	67/107	(66)	1.12	(0.67–1.86)	85/107	(78)	0.80	(0.44–1.45)
Parent characteristics								
Sex								
Male	356/605	(60)	1		463/605	(75)	1	
Female	441/639	(68)	1.41	(1.09–1.82)**	526/639	(81)	1.41	(1.04–1.91)*
Educational attainment								
High school degree or less	343/496	(69)	1		398/496	(78)	1	
Some college, no degree	201/327	(61)	0.68	(0.49–0.94)*	264/327	(81)	1.19	(0.80–1.75)
College degree or more	253/421	(63)	0.76	(0.56–1.03)	327/421	(78)	1.01	(0.71–1.44)
Use of indoor tanning devices (past 12 mos)								
Not at all	762/1172	(66)	1		947/1172	(80)	1	
1 time	35/72	(50)	0.51	(0.31–0.86)*	42/72	(57)	0.33	(0.20–0.56)**
							0.54	(0.32–0.92)*

Candidate correlates	Support ban					Support parental permission requirement					
	n/N	(%)	Bivariate		Multivari able		n/N	(%)	Bivariate		Multivari able
			OR	(95% CI)	OR	(95% CI)			OR	(95% CI)	
Willingness to give permission to indoor tan											
None	659/942	(69)	1		1		283/942	(83)	1		1
Low to high	138/302	(50)	0.44	(0.33–0.59)**	0.74	(0.53–1.05)	206/302	(66)	0.42	(0.30–0.58)**	0.68 (0.47–0.99)*
Perceived harms of indoor tanning											
Low to medium (1.0–4.0)	281/582	(50)	1		1		398/582	(68)	1		1
High (4.1–5.0)	516/662	(78)	3.66	(2.79–4.78)**	2.66	(1.97–3.59)**	591/662	(88)	3.70	(2.66–5.15)**	2.53 (1.77–3.62)**
Perceived benefits of indoor tanning											
Low (1.0–2.0)	420/532	(78)	1		1		470/532	(88)	1		1
Medium to high (2.1–5.0)	377/712	(54)	0.32	(0.24–0.43)**	0.49	(0.36–0.67)**	519/712	(71)	0.35	(0.2–0.49)**	0.54 (0.37–0.80)**
Household characteristics											
Annual income											
<\$35,000	186/258	(70)	1		—		208/258	(79)	1		—
\$35,000–\$74,999	225/351	(65)	0.77	(0.51–1.15)	—		277/351	(79)	1.00	(0.64–1.58)	—
\$75,000	386/635	(63)	0.72	(0.50–1.04)	—		504/635	(79)	1.01	(0.67–1.53)	—
Region											
Northeast	151/219	(70)	1		1		182/219	(82)	1		1
Midwest	182/305	(60)	0.65	(0.43–0.97)*	0.64	(0.41–1.00)	242/305	(79)	0.81	(0.50–1.33)	0.81 (0.47–1.37)
South	272/429	(64)	0.76	(0.52–1.11)	0.74	(0.49–1.13)	324/429	(74)	0.62	(0.39–0.98)*	0.66 (0.41–1.06)
West	192/291	(66)	0.85	(0.56–1.28)	0.68	(0.43–1.07)	241/291	(83)	1.03	(0.62–1.72)	1.00 (0.58–1.72)
Indoor tanning restrictions in state of residence											
None	40/69	(60)	1		—		56/69	(81)	1		—
Parental permission	259/409	(63)	1.14	(0.66–1.97)	—		318/409	(76)	0.76	(0.38–1.53)	—
Some minors banned	204/320	(65)	1.24	(0.71–2.18)	—		259/320	(80)	0.99	(0.48–2.01)	—
All minors banned	294/446	(67)	1.37	(0.80–2.37)	—		356/446	(80)	0.96	(0.48–1.92)	—

Notes: Table shows raw frequencies and weighted percentages and ORs. Boldface indicates statistical significance

* p<0.05;

** p<0.01).

Dashes (—) indicate the variable was not included in the multivariable model because it was not statistically significant at the bivariate level.

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript