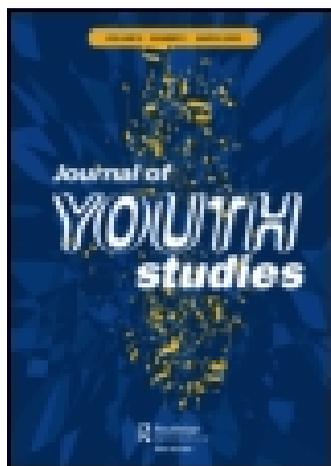


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Adolescent egocentrism and indoor tanning: is the relationship direct or mediated?

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This paper explored how imaginary audience and personal fable ideations contribute to adolescent indoor tanning intentions directly and indirectly through the way they shape pro-tanning attitude and association with peers who use tanning beds. Five hundred and ninety-five male ($n = 207$) and female ($n = 387$) adolescents, ranging in age from 11 to 19 ($M = 16.87$; $SD = 1.34$) years completed a cross-sectional survey. Measures included imaginary audience, personal fable (three dimensions: invulnerability, uniqueness, and omnipotence), pro-tanning attitude, association with peers who use tanning beds, and tanning bed use intentions. Bootstrapping analyses documented that imaginary audience ideations are indirectly associated with indoor tanning intentions through the mediation of pro-tanning attitude and association with peers who use tanning beds. Of the personal fable ideations, only invulnerability ideation is indirectly associated with indoor tanning intentions through the mediation of association with peers who use tanning beds. Design and evaluation of interventions and campaigns to reduce indoor tanning must be targeted to adolescents varying in imaginary audience ideations differently.

Keywords: association with peers; attitude toward tanning beds; egocentrism; imaginary audience; indoor tanning; personal fable; tanning intentions

Introduction

Indoor tanning is associated with increasing skin cancer rates in the USA, including both nonmelanoma skin cancers (i.e., basal cell carcinoma, squamous cell carcinoma) and melanoma (e.g., Jemal et al. 2011; Rogers et al. 2010; Ries et al. 2007). Nearly 30 million people tan indoors in the USA every year (Kwon et al. 2002), of which 2.3 million are teens (Demierre 2006). Adolescent use and prevalence of indoor tanning beds has become an issue of concern due to the associated formidable health risks (Cokkinides et al. 2002). In fact, first exposure to tanning beds in youth increases melanoma risk by 75% (The International Agency for Research on Cancer Working Group On Artificial Ultraviolet (UV) Light And Skin Cancer 2006). Given these alarming risks of indoor

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†Deceased

tanning in early years, it is imperative to examine why adolescents engage in this behavior so that prevention efforts are targeted appropriately. Whereas prior research has highlighted personality-related, attitudinal, appearance-related, and normative factors that motivate adolescent indoor tanning (e.g., Bagdasarov et al. 2008; Banerjee et al. 2009; Hillhouse, Turrisi, and Kastner 2000; Lazovich and Forster 2005; Stapleton, Turrisi, and Hillhouse 2008), in this paper, we focus on developmental aspects of adolescence that may motivate indoor tanning.

Adolescence is a time of transitions in physical, cognitive, and socioemotional realms. These changes influence adolescents' personal thoughts and behaviors (Elkind 1967). Prior research has demonstrated that adolescents display developmental differences in terms of cognitive-social immaturity, i.e., are not sufficiently able to assess the risks, the costs and benefits of engaging in risky behavior, and therefore, are more likely than older adults to engage in risk behaviors (e.g., Alberts, Elkind, and Ginsberg 2007; Arnett 1992; Greene et al. 2000). Recent research has conceptualized tanning bed use as a high health risk behavior (Banerjee et al. 2009; Murray and Turner 2004; Guy et al. 2014), but no prior research to date has examined the contribution of egocentrism to explain adolescent intentions to indoor tan or indoor tanning behavior. Among multiple theories of why adolescents engage in high-risk behaviors, one that has been used frequently (albeit, not with indoor tanning) is the belief that adolescents engage in risk behaviors partly because of their false sense of invulnerability to injury, harm, or danger (Lapsley and Hill 2010). Using the same theoretical approach, the goal of this paper was to examine the relative contribution of adolescent egocentrism to explain indoor tanning in presence of mediators such as pro-tanning attitudes and association with peers who use tanning beds.

Adolescent egocentrism

The concept of egocentrism can be understood as a lack of differentiation in some area of subject-object interaction (Piaget 2000). Elkind (1967) explains that this lack of differentiation takes a unique form and is manifested in a unique set of behaviors at each stage of mental development charted by Piaget. Adolescent egocentrism is characterized by the capacity to take account of other people's thoughts, as Elkind (1967, 1030) describes, 'It is this belief that others are preoccupied with his appearance and behavior that constitutes the egocentrism of the adolescent.' Adolescent egocentrism emerges in the form of two expressions: (1) imaginary audience, characterized by the inability to differentiate between the object of thought leading to the thinking that others are preoccupied with you because you are preoccupied with yourself; and (2) personal fable, characterized by new ability to think about one's and others' thoughts leading to pervasive unrealistic beliefs in one's uniqueness, omnipotence, and invulnerability to harm.

Egocentrism has been examined in the context of adolescent health risk behaviors including disordered eating and anorexia nervosa (Fox et al. 2009), cigarette smoking (Bright, McKillop, and Ryder 2008; Frankenberger 2004), unsafe sex (Greene et al. 2000), and substance use (Omori and Ingersoll 2005). These studies have been inconsistent in their conclusions regarding the role of personal fable and imaginary audience in health risk behaviors. For instance, Greene et al. (2000) found that higher personal fable ideations (specifically, the invulnerability dimension) explained drug use and delinquency. In contrast, discounting the role of adolescent egocentrism, Frankenberger (2004) concluded that overall, egocentrism was not related to adolescent smoking behavior.

This inconsistency may in part be explained by the different health risk behaviors examined because the motivations for smoking, teen drinking, and unsafe sex are very different. In a review article, Vartanian (2000, 654) concludes by suggesting:

Thus, one direction for additional research might be to better test the links between imaginary audience and personal fable ideations and specific, relevant outcome variables, such as social anxiety, patterns of disturbed eating, vandalism, or specific types of risk-taking behavior.

In the current paper, we address this call for research and examine whether the association between imaginary audience and personal fable ideations and indoor tanning intentions is direct or mediated by pro-tanning attitude and association with peers who use tanning beds.

Direct association between imaginary audience and personal fable with adolescent indoor tanning

Higher imaginary audience ideations may motivate greater efforts to appear attractive, and indoor tanning for enhancing attractiveness has been demonstrated in prior research (e.g., Hillhouse, Turrisi, and Kastner 2000; Lazovich and Forster 2005; Stapleton, Turrisi, and Hillhouse 2008). Similarly, higher personal fable ideations may give rise to greater sense of omnipotence, invulnerability, and uniqueness with a higher propensity for behavioral risk-taking (Elkind 1967), and may be manifested in the form of adolescent tanning bed use. Prior research on the association between imaginary audience and personal fable ideations and indoor tanning is limited. However, based on prior research on other risk behaviors and adolescent egocentrism, we hypothesize that imaginary audience and personal fable ideations will be positively (and directly) associated with adolescent tanning bed use (Paths 1 and 2).

Mediated associations between imaginary audience, personal fable, and adolescent indoor tanning

Imaginary audience and personal fable ideations contribute to behavioral risk-taking, but the pathways through which this relationship might be mediated are less clear. We aimed to explore the mediated pathways of influence that link imaginary audience and personal fable ideations with indoor tanning. In particular, we propose that the relationship between imaginary audience, personal fable, and indoor tanning will be mediated through pro-tanning attitude and association with peers who use tanning beds. Figure 1 represents the proposed model. Besides, the direct associations between imaginary audience, personal fable, and indoor tanning (Paths 1 and 2), we propose three mediated pathways of influence, which is described later.

Imaginary audience, pro-tanning attitudes, and adolescent indoor tanning

Adolescents high in imaginary audience ideations are likely to have a pro-tanning attitude because they may construct an imaginary audience of onlookers who share the adolescents' concerns for their own behaviors and appearance (Elkind 1967, 1978). Elkind (1978) argues that the presence of an admiring or fault-finding (imaginary) audience helps to explain the heightened self-consciousness characteristic of early adolescence. This heightened self-consciousness often manifests as concerns with physical appearance (Solomon and Schopler

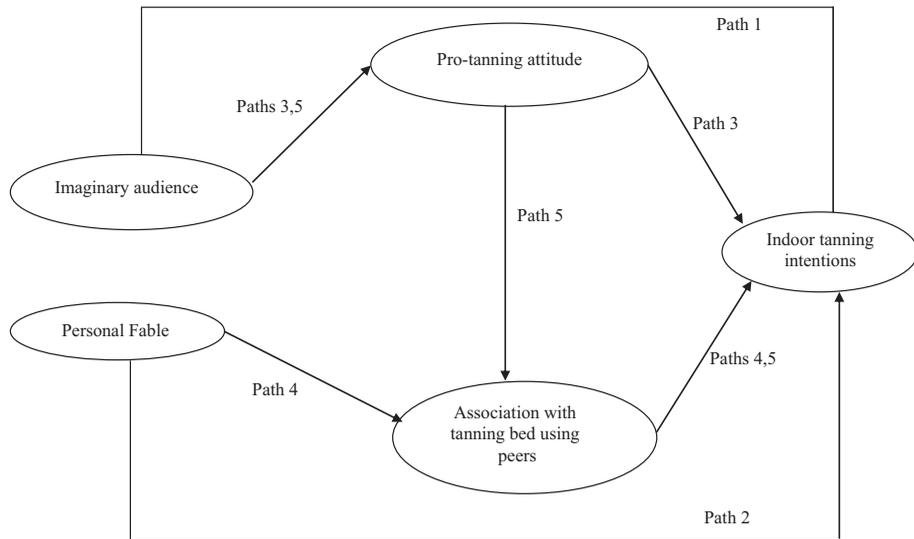


Figure 1. Model depicting the hypothesized direct and mediated effects of imaginary audience and personal fable on adolescent indoor tanning intentions.

1982), and may lead to behaviors for appearance enhancement such as use of make-up (Miller and Cox 1982), dieting and/or disordered eating (e.g., Fox et al. 2009), and indoor tanning (Lazovich and Forster 2005), among others. Appearance enhancement has consistently been documented as one of the primary motivations for indoor tanning (e.g., Hillhouse, Turrisi, and Kastner 2000; Stapleton, Turrisi, and Hillhouse 2008). Adolescents who are especially willing to please others or insecure about their appearance may be more prone to tan and have pro-tanning attitudes, although this association has not been examined in prior research (with the exception of research by Greene and Brinn 2003).

Studies have demonstrated that pro-tanning beliefs and attitudes (such as, I look more attractive when I tan, I feel more confident when I tan, I look healthier when I am tan) are good predictors of tanning intentions (Bagdasarov et al. 2008; Cokkinides et al. 2002). In a review of adolescent indoor tanning, Lazovich and Forster (2005) concluded that pro-tanning beliefs and attitudes are consistently cited as strong predictors of adolescent indoor tanning. Cristiane et al. (2005) reason that adolescents harbor beliefs that a tanned look generates social appeal and shows a healthy appearance, and deny long-term risks resulting in intentional UV exposure. Based on these studies, we propose that attitude toward tanning bed use will be directly related to indoor tanning intentions. Additionally, we forward the proposition that attitude toward tanning will mediate the relationship between imaginary audience ideations and indoor tanning intentions (Path 3).

Personal fable, association with peers who use tanning beds, and adolescent indoor tanning

Adolescents high in personal fable ideations may tend to have friends who engage in similar risk behaviors because of perceptions of reduced susceptibility to dangers associated with health risk behaviors. Research has consistently demonstrated that affiliation with friends/peers who engage in similar health risk behaviors is a significant predictor of self-engagement in health risk behaviors (e.g., Banerjee et al. 2009; Geller

et al. 2002; Prinstein, Boergers, and Spirito 2001). Given that indoor tanning has been conceptualized as a health risk behavior (Bagdasarov et al. 2008; Banerjee et al. 2009; Murray and Turner 2004), we propose that adolescents high in personal fable ideations will have greater association with friends who use tanning beds, and this association will motivate indoor tanning intentions (Path 4).

Therefore, in the context of indoor tanning, one pathway of influence for adolescents high in personal fable ideations to engage in higher indoor tanning includes association with others who tan. In a review, Lazovich and Forster (2005) report that holding the view that a high proportion of friends' peers indoor tan increases the likelihood of adolescent tanning. We explain this finding by suggesting that it is adolescents' obsession with themselves and/or the belief that they cannot be harmed that contributes to indoor tanning indirectly, through mediation with friends and/or acquaintances that tan indoors. Banerjee et al. (2009) documented that young adults' engagement in indoor tanning was related to their friends' engagement in the same behavior. Whereas Banerjee et al. (2009) explained indoor tanning from a personality approach (examining the role of sensation seeking, a personality variable), here we take a developmental approach and examine the role of personal fable.

Imaginary audience, pro-tanning attitude, association with peers who use tanning beds, and adolescent indoor tanning

Positive beliefs and attitudes about tanning and having friends who are tanned are associated with increased indoor tanning by adolescents (e.g., Geller et al. 2002). O'Riordan et al. (2006) concluded that adolescent girls who held positive beliefs about tanning and friends who used tanning beds and are most likely to indoor tan. Furthermore, Branstrom, Ullen, and Brandberg (2004) found that positive attitude toward being tanned and being around tanned people was related to intentional tanning. These studies consistently show that both pro-tanning attitude and association with friends and peers who use tanning beds contribute to indoor tanning intentions. We aimed to explore this relationship and propose that imaginary audience ideations contribute to adoption of pro-tanning attitude, and this attitude increases social interaction with friends (or peers) who tan regularly, further leading to increased likelihood of indoor tanning (Path 5).

Summary of proposed relationships

The model in Figure 1 presents a hypothesized set of relationships linking imaginary audience and personal fable with pro-tanning attitude and association with peers who use tanning beds, and finally, with adolescent indoor tanning intentions. We suggest that imaginary audience and personal fable may be associated with indoor tanning intentions in one of the five ways. First, imaginary audience ideations may contribute to indoor tanning intentions directly (Path 1). Second, personal fable ideations may contribute to indoor tanning intentions directly (Path 2). Third, imaginary audience may affect an individual's attitude toward tanning bed use, which then leads to indoor tanning intentions (Path 3). Fourth, personal fable ideations may lead to association with friends who use tanning beds, which then leads to indoor tanning intentions (Path 4). However, imaginary audience ideations may also indirectly affect association with friends who use tanning beds to the extent that imaginary audience ideations motivate pro-tanning attitude and this attitude, in turn, leads to association with tanning bed using peers and indoor tanning intentions (Path 5).

Method

Procedure

After receiving human subjects' approval from the University Institutional Review Board, adolescents were recruited by trained undergraduate students in a communication research methods course at a large northeastern university in the USA. Students' participation in this project was one of the four options available in a research methods course.

Adolescents received no payment for participation; however, recruitment of adolescent participants (or design and execution of individual study) was one option to fulfill a required course assignment in an undergraduate research methods course. Student researchers ($N = 83$) completed extensive training prior to being accepted for this project. After parental consent, surveys were completed by adolescents individually with the researcher present (approximately 20–30 minutes) as part of a larger project on tanning bed use. Participants placed completed surveys in large envelopes, sealed and returned them to the student researcher. Student researchers then submitted sealed manila folders to researchers separate from consent forms. A total of 664 surveys were distributed (eight surveys per student). Two months later, 608 surveys were returned. We conducted random call backs on the returned parental consent forms. One set of surveys was discarded either because the parent had no recollection of consent or because the parent at the number provided did not speak English ($n = 11$). We were conservative with these decisions and removed the student researcher's total set (i.e., eight surveys) if there was any question regarding the validity of consent or sample eligibility. Upon cleaning and screening the data, two additional participants were removed because they were outside of the normative age of high school students (e.g., more than 19 years).

Participants

The final sample consisted of 595 male ($n = 207$) and female ($n = 387$) adolescents (one participant did not indicate gender), ranging in age from 11 to 19 ($M = 16.87$; $SD = 1.34$) years. The sample reported ethnicity as predominantly Caucasian (69%), with 11% Asian/Pacific Islander, 6% Hispanic/Latino, 6% other race, 5% African American, and 3% bi-/multiracial. Of these participants, 28% indicated that they had ever indoor tanned.

Measurement instruments

The variables in this study are imaginary audience, personal fable, pro-tanning attitude, association with peers who use tanning beds, and indoor tanning intentions.

Imaginary audience

We used a shortened version of the imaginary audience scale developed by Walters et al. (1991). The scale consisted of a common stem for all items, 'How often would you feel...', and was measured with five Likert-type items with responses ranging from 1 (never) to 5 (always). For instance, 'Embarrassed at not being invited to a party.' The five items were averaged to form one scale with a higher score indicating greater imaginary audience ideation ($M = 2.17$, $SD = 0.64$, $\alpha = 0.74$).

Personal fable

We used a shortened version of the personal fable scale developed by Lapsley (1993). This scale yields three subfactors: omnipotence, uniqueness, and invulnerability. The items for

each of these subfactors were measured with four Likert-type items with responses ranging from 1 (strongly disagree) to 5 (strongly agree). The items were averaged to form a scale with a higher score indicating greater omnipotence, uniqueness, and invulnerability.

Omnipotence was measured with three items, 'I believe I can do anything I set my mind to,' 'I tend to doubt myself' (R), and 'It often seems like everything I do turns out great' ($M = 3.18$, $SD = .66$, $\alpha = .57$). Uniqueness was measured with four items, 'I'm the only one that can understand me,' 'No one sees the world the way that I do,' 'I am just like everyone else' (R), and 'I'm somehow different from everyone else' ($M = 3.30$, $SD = .69$, $\alpha = .58$). Invulnerability was measured with four items, 'I enjoy taking risks,' 'It is easy to take risks because I never get hurt,' 'I don't believe in taking chances' (R), and 'I am not afraid to do dangerous things' ($M = 3.08$, $SD = .70$, $\alpha = .61$).

Pro-tanning attitude

The measure of pro-tanning attitude use was adapted from tanning attitudes measures by Greene and Brinn (2003), and consisted of four Likert-type items with 5-point responses ranging from 1 (strongly disagree) to 5 (strongly agree) such as, 'I look more attractive with a tan than without a tan.' The scores on the four items were averaged with a higher score indicating more favorable pro-tanning attitude ($M = 2.83$, $SD = .92$; $\alpha = .81$).

Association with peers who use tanning beds

Four items measured association with peers who use tanning beds. For instance, 'In your best estimate, what percent students in your school use tanning beds?' Participants were instructed to write number of friends. The items were averaged with a higher score indicating greater association with peers who use tanning beds ($M = 24.36$, $SD = 18.83$, range: 0–86.67; $\alpha = .64$).

Indoor tanning intentions

Intentions to indoor tan was measured using self-reported intention to indoor tan over different times of the year (winter, spring, and fall), and for special events (such as weddings, dances, social events) measured on a 5-point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree) as a proxy of future behavior. The scores on the four items were averaged with a higher score indicating greater likelihood of tanning ($M = 1.93$, $SD = 1.12$; $\alpha = .95$).

Although the study did ask respondents directly about indoor tanning behavior, it did so in relation to prior indoor tanning. Given that in addition to exogenous variable (imaginary audience and personal fable), the two remaining endogenous variables in Figure 1 (i.e., association with peers and pro-tanning attitude) are hypothesized to cause actual indoor tanning behavior (and therefore should precede the occurrence of this variable time wise), using a retrospective measure of indoor tanning was logically incompatible. As behavioral intentions are the immediate antecedents and the single best predictor of actual behavior (Fishbein et al. 2001), the use of indoor tanning intentions as the outcome variable in the model seemed reasonable.

Data analyses

We examined the Paths 1 and 2 to analyze the direct effect of imaginary audience and personal fable ideations on indoor tanning intention using correlational analysis with level of significance set at $p < .01$ to protect against Type I error. As well, we investigated

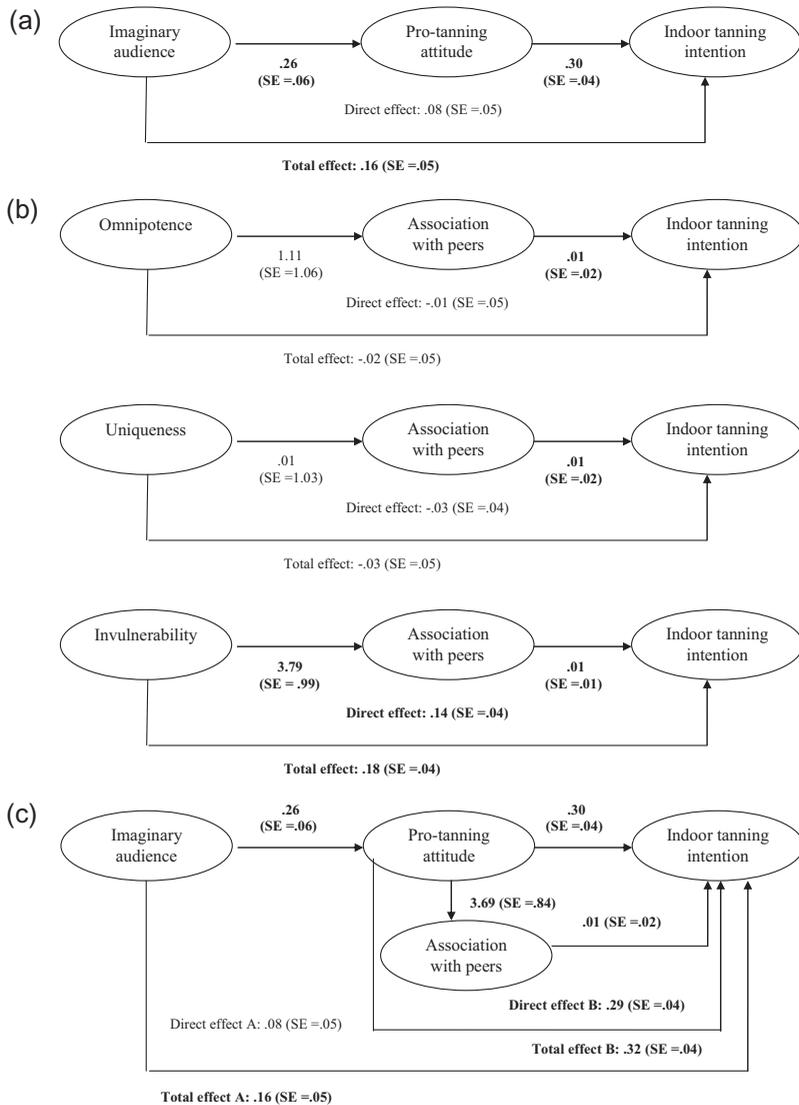


Figure 2. (a) Paths 1 and 3: Model depicting mediated effects of imaginary audience on adolescent indoor tanning intentions (unstandardized beta and SE). (b) Paths 2–4: Model depicting mediated effects of personal fable on adolescent indoor tanning intentions (unstandardized beta and SE). (c) Path 5: Model depicting multiple mediated effects of imaginary audience on adolescent indoor tanning intentions (unstandardized beta and SE).

Note: (a–b) Variables in bold denote significant paths. Direct effect refers to the direct effect of IV on indoor tanning intention; total effect refers to the effect of IV on indoor tanning intentions in the presence of a mediator.

(c) Direct effect A refers to the direct effect of imaginary audience on indoor tanning intention; total effect A refers to the effect of imaginary audience on indoor tanning intentions in the presence of a mediator – pro-tanning attitude. Direct effect B refers to the direct effect of pro-tanning attitude on indoor tanning intention; total effect B refers to the effect of pro-tanning attitude on indoor tanning intentions in the presence of a mediator – association with peers who tan.

other study hypotheses (Figure 1) for investigating multiple mediation by testing five models, using bootstrapping procedures (Preacher and Hayes 2008); for Path 3 (Model 1; Figure 2a): the total indirect effect of imaginary audience on indoor tanning intention through pro-tanning attitude; for Path 4 (Models 2–4; Figure 2b): the total direct and indirect effect of personal fable constructs (i.e., omnipotence, uniqueness, and invulnerability, respectively) on indoor tanning intention through association with peers who use tanning beds; and for Path 5 (Model 5; Figure 2c): the total indirect effect of imaginary audience on indoor tanning intention through pro-tanning attitude and association with peers who use tanning beds.¹

Bootstrapping procedure

We used bootstrapping procedures (Preacher and Hayes 2008) to obtain estimates of total and specific indirect effects and to test their significance by using confidence intervals (CIs).² We used SPSS macros (downloaded from quantpsy.org) that accompanies the paper by Preacher and Hayes (2008) on testing mediation and multiple mediation models, respectively, to conduct the main analyses. Bootstrapping is one of the most widely used re-sampling strategies for estimation and hypothesis testing. Using computer-based methods, the sample is conceptualized as a pseudo-population that represents the broader population from which the sample was derived, and the sampling distribution of any statistic is generated by calculating the statistic of interest in multiple resamples of the data set (Preacher, Rucker, and Hayes 2007).

Calculation of the specific indirect effects involved four steps (Preacher and Hayes 2008): (1) from our original dataset of 595 cases, a bootstrap sample of 554 cases was generated using random sampling with replacement; (2) the regression coefficients (a and b) and the indirect effect estimates (ab) were calculated based on this bootstrap sample; (3) by repeating this process 5000 times, 5000 estimates of the total and specific indirect effects of the independent variable (imaginary audience, omnipotence, uniqueness, and invulnerability) on indoor tanning intention were obtained; and (4) the bootstrap CI for the population-specific indirect effect was derived. If a zero was not included in the 95% CI of the estimate (while analyzing lower and upper CI levels), we concluded that the indirect effect was statistically significant (Preacher and Hayes 2008). These bootstrapped indirect estimates were used in case of both mediation and multiple mediation models.

Results

Table 1 presents the zero-order correlation matrix for all variables. Indoor tanning intention was significantly correlated with imaginary audience, uniqueness, and invulnerability ideations, association with peers who use tanning beds, pro-tanning attitude, and female participants. Pro-tanning attitude was significantly associated with imaginary audience, invulnerability, and association with peers who use tanning beds. Finally, association with peers who use tanning beds was significantly associated with the invulnerability dimension of personal fable. From the results of the correlation analyses, the hypothesis for Path 1 was supported, and imaginary audience ideations have a significant correlation with indoor tanning intentions. On the other hand, the hypothesis for Path 2 was partially supported, and uniqueness and invulnerability ideations (but not omnipotence) have a significant association with indoor tanning intentions. We further confirmed the results during bootstrapping procedures.

Table 1. Sex, race, and age differences in study variables.

Variables	Sex differences			Race differences			Age differences		
	Males <i>M</i> (SD)	Females <i>M</i> (SD)	<i>t</i> (550)	White <i>M</i> (SD)	Other <i>M</i> (SD)	<i>t</i> (550)	Younger <i>M</i> (SD)	Older <i>M</i> (SD)	<i>t</i> (550)
Imaginary audience	1.94 (.60)	2.31 (.62)	-6.78***	2.19 (.63)	2.14 (.67)	.78	2.19 (.62)	2.15 (.67)	.65
Omnipotence	3.28 (.67)	3.12 (.65)	2.67**	3.18 (.66)	3.16 (.67)	.42	3.12 (.65)	3.26 (.68)	-2.30*
Uniqueness	3.30 (.69)	3.29 (.68)	.15	3.22 (.68)	3.47 (.66)	-4.03***	3.33 (.69)	3.25 (.66)	1.38
Invulnerability	3.25 (.67)	3.01 (.71)	4.04**	3.10 (.72)	3.04 (.68)	.91	3.05 (.73)	3.14 (.66)	-1.34
Association with peers	19.11 (17.08)	27.18 (19.15)	-4.92***	26.32 (19.15)	19.97 (17.37)	3.71***	21.20 (17.70)	29.34 (19.53)	-5.05***
Pro-tanning attitude	2.59 (.80)	2.96 (.96)	-4.61***	2.96 (.89)	2.54 (.92)	5.02***	2.75 (.88)	2.95 (.96)	-2.46*
Indoor tanning intentions	1.45 (.74)	2.21 (1.21)	-8.06***	2.01 (1.15)	1.79 (1.04)	2.12*	1.80 (1.01)	2.17 (1.26)	-3.82***

* $p < .05$, ** $p < .01$, *** $p < .001$.

Table 2. Past indoor tanning use differences in study variables.

Variables	Past tanning bed use differences		<i>t</i> (550)
	Past tanning bed use <i>M</i> (SD)	No past tanning bed use <i>M</i> (SD)	
Imaginary audience	2.25 (.67)	2.15 (.63)	1.58
Omnipotence	3.25 (.72)	3.15 (.64)	1.63
Uniqueness	3.19 (.70)	3.34 (.68)	-2.24*
Invulnerability	3.14 (.69)	3.07 (.71)	1.04
Association with peers	38.86 (18.31)	18.76 (15.83)	12.77**
Pro-tanning attitude	3.48 (.74)	2.58 (.86)	11.57**
Indoor tanning intentions	3.25 (1.00)	1.44 (.67)	24.50**

* $p < .05$, ** $p < .001$.

Preliminary analyses

Before testing our hypotheses, we conducted preliminary analyses. We evaluated sex, age, race, and prior tanning bed use differences on all of the variables in the study by conducting appropriate *t*-tests (for sex, race, age-median split at 17 years, and prior tanning bed use). Results of *t*-tests (Tables 1 and 2) documented several significant findings: (1) females report greater imaginary audience ideations, association with peers who tan, more pro-tanning attitude, and greater indoor tanning intentions than males, while males are higher in omnipotence and invulnerability ideations than females; (2) Whites report greater association with peers who tan, more pro-tanning attitude and greater indoor tanning intentions than other races, while other races report higher uniqueness ideations than Whites; (3) participants with prior indoor tanning use report greater association with peers who tan, pro-tanning attitude, and indoor tanning intentions than participants with no prior indoor tanning experience, while participants with no prior indoor tanning experience report more uniqueness ideations than participants with prior indoor tanning use; and (4) older adolescents reported greater omnipotence, association with peers who tan, pro-tanning attitude, and indoor tanning intentions than younger adolescents. Therefore, we controlled for respondent's sex, race, age, and prior indoor tanning experience prior to conducting the bootstrapping procedures.

Bootstrapping results

Model 1: The bootstrapped estimates for the total and specific indirect effects obtained are as follows: bootstrap estimate = .08, SE = .02, bias corrected and accelerated (BCa) 95% CI (lower) = .0482, BCa 95% CI (upper) = .1212. The total indirect effect of imaginary audience on indoor tanning intention through pro-tanning attitude was statistically significant, as the CI did not contain a zero. Therefore, we reject the null hypothesis that the total indirect effect of imaginary audience on indoor tanning intention is zero. The direct path of imaginary audience ideations on indoor tanning intentions was not significant, unstandardized beta = .08, SE = .05, $p = .08$, suggesting a partial mediation.

We proceeded to investigate the significance of the specific indirect effects associated with the mediators. We tested for the indirect effect of imaginary audience on indoor tanning intention through pro-tanning attitude controlling for the covariates: age, gender, race, and prior indoor tanning experience, and the overall model was significant, $F(6, 547)$

= 121.37, $p < .001$, Adj. $R^2 = .56$. Pro-tanning attitude was a significant mediator in the relationship between imaginary audience and indoor tanning intention. The direction of association was as follows: higher imaginary audience ideations were associated with a greater pro-tanning attitude, which was in turn associated with greater indoor tanning intentions; therefore, the hypothesis for Path 3 was supported. Please see [Figure 2a](#) for Model 1.

Models 2–4: The bootstrapped estimates for the total and specific indirect effects obtained for three models (with omnipotence, uniqueness, and invulnerability as independent variables, respectively) are as follows: For *omnipotence*: bootstrap estimate = .01, SE = .01, BCa 95% CI (lower) = $-.0118$, BCa 95% CI (upper) = .0336; for *uniqueness*: bootstrap estimate = .00, SE = .01, BCa 95% CI (lower) = $-.0179$, BCa 95% CI (upper) = .0230; for *invulnerability*: bootstrap estimate = .03, SE = .01, BCa 95% CI (lower) = .0131, BCa 95% CI (upper) = .0585. The total indirect effect of omnipotence and uniqueness on indoor tanning intention through association with peers who tan was statistically not significant, as the CI contained a zero; however, the total indirect effects of invulnerability on indoor tanning intention through association with peers who tan was statistically significant, as the CI did not contain a zero. As well, the direct path from omnipotence, unstandardized beta = $-.02$, SE = .05, $p = .70$ and uniqueness, unstandardized beta = $-.03$, SE = .04, $p = .48$ on indoor tanning intentions were not significant. However, the direct path from invulnerability to indoor tanning intentions, unstandardized beta = .14, SE = .04, $p < .001$ was significant, suggesting partial mediation.

The overall model for the indirect effect of invulnerability on indoor tanning intention through association with peers who tan controlling for the covariates: age, gender, race, and prior indoor tanning experience was significant, $F(6, 547) = 105.77$, $p < .001$, Adj. $R^2 = .53$. The direction of association was as follows: higher invulnerability ideations were associated with a greater association with peers who tan, which was in turn associated with greater indoor tanning intentions; therefore, hypothesis for Path 4 was partially supported. Please see [Figure 2b](#) for Models 2–4.

Model 5: Model 5 was run twice, to estimate the indirect effect of imaginary audience on indoor tanning intentions through pro-tanning attitude [bootstrap estimate = .08, SE = .02, BCa 95% CI (lower) = .0482, BCa 95% CI (upper) = .1212], and to estimate the effect of pro-tanning attitude on indoor tanning intentions through association with peers who tan [bootstrap estimate = .03, SE = .01, BCa 95% CI (lower) = .0108, BCa 95% CI (upper) = .0486]. In both the models, age, gender, race, and prior indoor tanning experience were included as controls. The total indirect effect of imaginary audience on indoor tanning intention through pro-tanning attitude was statistically significant, and the total indirect effect of pro-tanning attitude on indoor tanning intentions through association with peers who tan was significant, as the CIs in both models did not contain a zero.

The overall model for the indirect effect of imaginary audience on indoor tanning intentions through pro-tanning attitude was significant, $F(6, 547) = 105.77$, $p < .001$, Adj. $R^2 = .53$. As well, the overall model for the indirect effect of pro-tanning attitude on indoor tanning intentions through association with peers who tan was significant, $F(6, 547) = 125.87$, $p < .001$, Adj. $R^2 = .58$. Thus, the hypothesis for Path 5 was supported, and higher imaginary audience ideations were associated with greater pro-tanning attitude, which was related to a greater association with peers who tan, which was in turn related to greater indoor tanning intentions. Please see [Figure 2c](#) for Model 5.

To summarize, the results of the structural equation modeling (SEM) model demonstrate that: (1) for Path 1 (supported), imaginary audience ideations are associated

with indoor tanning intentions; for Path 2 (partially supported), personal fable ideations are not associated with indoor tanning intentions (except for invulnerability, supported); for Path 3 (supported), imaginary audience ideations are associated with attitude toward tanning bed use, which are further associated with indoor tanning intentions; for Path 4 (partially supported), personal fable ideations are not associated with association with friends who use tanning beds (except for invulnerability), but association with friends who use tanning beds is directly related to indoor tanning intentions; and finally for Path 5 (supported), imaginary audience ideations are associated with pro-tanning attitude and this attitude, in turn, is directly linked with association with tanning bed using peers, which is further associated with indoor tanning intentions. Therefore, these results demonstrate that the relation between imaginary audience and indoor tanning intentions is mediated by pro-tanning attitude and association with peers who use tanning beds. Invulnerability ideations also contribute to indoor tanning intentions indirectly through association with peers who use tanning beds.

Discussion

This study examined how adolescent imaginary audience and personal fable ideations contribute to indoor tanning intentions both directly and indirectly through pro-tanning attitude and association with peers who use tanning beds.

Imaginary audience and indoor tanning intentions

Path 1 clearly delineated a direct association between imaginary audience ideations and indoor tanning intentions. As well, supported by Paths 3 and 5, imaginary audience ideations instill pro-tanning attitude, which motivates indoor tanning intentions; as well, imaginary audience ideations instill pro-tanning attitude, which motivates greater association with peers who use tanning beds, and these factors further contribute to indoor tanning intentions, respectively. Both the paths were supported in this study. No prior research has examined these pathways of association, and this study contributes by providing an explication of the associations through which imaginary audience ideations lead to indoor tanning intentions. Greene and Brinn (2003) demonstrated that imaginary audience ideations were positively associated with indoor tanning intentions (in bivariate association), but the relationship was no longer significant when other personality variables (e.g., body image, eating disorders) were entered in a regression analyses. The present study demonstrates there is a significant correlation between imaginary audience ideations and indoor tanning intentions, but in a SEM model, the relationship disappears when pro-tanning attitude and association with peers who use tanning beds are included as mediators.

Adolescents high in imaginary audience ideations may be more self-conscious and therefore have positive attitude toward appearance-enhancement behaviors (Ryan and Kuczowski 1994). The present study was focused only on indoor tanning, which has been contextualized as an appearance-enhancement behavior (e.g., Stapleton, Turrisi, and Hillhouse 2008). Because imaginary audience has also been associated with weight concerns and disordered eating (e.g., Fox et al. 2009), future research could examine attitudes of adolescents high in imaginary audience ideations regarding other appearance enhancing high-risk behaviors.

As demonstrated in prior research (Yanovitzky 2005), a pro-attitudinal perception is often strongly associated with having friends who engage in the same behavior. In a large national survey on the skin cancer-related attitudes and practices of US children and

adolescents, Geller et al. (2002) demonstrated that having many friends who were tanned and beliefs in the worth of burning to get a tan were generally associated with tanning bed use among adolescents. Therefore, our hypothesized path demonstrating that imaginary audience ideations instill pro-tanning attitude, which motivate greater association with peers who use tanning beds, and these factors further contribute to indoor tanning intentions appear logical and demonstrate the mediated associations contributing to indoor tanning intentions.

Personal fable ideations and indoor tanning intentions

The present study did not show any significant direct or indirect association between personal fable ideations and indoor tanning intentions, with one exception (for invulnerability), partially supporting Paths 2 and 4. To delineate the results further, it is important to delve into the three components of personal fable: omnipotence, uniqueness, and invulnerability. Whereas omnipotence refers to the increased sense of self-worth and a belief that one's actions are particularly informative or influential, uniqueness attests to the sense that one is the focus of attention for others, and that others cannot understand what one feels or experiences, and invulnerability focuses on a sense that the risks of actions are less for oneself than for others (Hill, Gadbois, and Lapsley 2008). Whereas invulnerability has been associated with engagement in high-risk behaviors (e.g., Aalsma, Lapsley, and Flannery 2006; Lapsley, Aalsma, and Hapern-Felsher 2005; Lapsley and Hill 2010), research with omnipotence and uniqueness indicates mixed results. In fact, research suggests that the three constructs of personal fable serve both adaptive and maladaptive functions; for instance, predicting risk behavior as well as adaptive, coping, and resilience (Aalsma, Lapsley, and Flannery 2006). It is certainly possible that omnipotence and uniqueness served an adaptive role in this study, and were related with a positive self-worth and body image, and therefore showed weak associations with indoor tanning. A deeper focus on the other psychological correlates of indoor tanning such as self-worth, self-consciousness, and body image issues would provide us with a greater understanding of the relationship between personal fable and indoor tanning.

The invulnerability ideation motivated greater association with peers who use tanning beds, leading to greater indoor tanning intentions. Invulnerability is characterized by the sense of immortality and belief that harmful outcomes are more likely for others than for the self (Elkind 1967), and these cognitive beliefs account for adolescent risk-taking behaviors and association with others who engage in similar risk behaviors. Adolescent engagement in health risk behaviors such as smoking, alcohol consumption, and drug use is related to their friends' engagement in health risk behaviors (Prinstein, Boergers, and Spirito 2001). Applying the same corollary, we explain our finding for Path 4 by suggesting that the invulnerability characteristic of adolescents make them more prone to associate with peers who use tanning beds, and this association motivates greater likelihood of indoor tanning.

We acknowledge that all health risk behaviors are not similar. Using the same disclaimer as cited by Banerjee et al. (2009, 991), we clarify that 'use of tanning beds is not the same as using drugs because whereas use of drugs is an illegal activity, use of tanning beds is legal (depending on age and parental consent).' However, current research has suggested that indoor tanning use may be a part of youth engagement in problem behaviors (Bagdasarov et al. 2008), given that positive associations have been reported between indoor tanning intentions and substance use (e.g., Mosher and Danoff-Burg 2010; O'Riordan et al. 2006). In a more recent study, utilizing data from the 2009 and

2011 national Youth Risk Behavior surveys, it was found that indoor tanning among male and female students was significantly associated with other risk-taking behaviors such as binge drinking, unhealthy weight control practices, and having sexual intercourse. Additionally, indoor tanning among female students was associated with using illegal drugs and having sexual intercourse with four or more persons, and use among male students was associated with taking steroids without a physician's prescription, smoking cigarettes daily, and attempting suicide (Guy et al. 2014). Such findings, particularly demonstrating a clustering of risky health behaviors, reflect adolescents' vulnerability and indicate emergence of risky health-related behaviors in the adolescent environment (Calkins 2010; Guy et al. 2014). Future research could examine the social networks of adolescents to identify peer group members' tanning bed use norms and engagement in other health risk behaviors.

Limitations of the study

There are a number of potential limitations in the present study that should be noted. First, there were a number of demographic limitations. These data were collected from one densely populated northeastern state in the USA, and it is not known whether these results would generalize to other areas of the country. Second, this study utilized cross-sectional survey data to examine pathways of association, thereby limiting the causal interpretation of results. Longitudinal studies that examine the effect of adolescent developmental factors on tanning bed use may help fully disentangle the causal relationship. Third, we utilized Elkind's (1967) approach to invulnerability that results from the cognitive egocentrism and contributes to adolescent beliefs in personal fable ideations. Other literature has identified adolescent invulnerability to threat, harm, or danger as a separate construct, which includes two dimensions: danger invulnerability and psychological invulnerability (Lapsley and Hill 2010). Future studies could explore the associations between these two conceptualizations of invulnerability (one, as a subset of adolescent personal fable, and the other as a separate construct) and indoor tanning. Finally, this study utilized indoor tanning intentions as a proxy for testing the associations between adolescent egocentrism and indoor tanning behavior. Future work could utilize past indoor tanning behavior measure and compare a retrospective model demonstrating the relationship between adolescent egocentrism and past indoor tanning behavior with a prospective model demonstrating the associations between adolescent egocentrism and future indoor tanning intentions.

Implications of the study

This study has both theoretical and practical implications. Theoretically, it demonstrates the importance of studying both direct and indirect effects of developmental variables that may contribute to adolescent indoor tanning (although we measured indoor tanning intentions in this study). Imaginary audience and invulnerability ideations represent a pattern of cognitive thought, whereby the focus is on oneself and unrealistic beliefs about one's invulnerability to harm (Elkind 1967). This study suggests pathways of influence that make adolescents high in imaginary audience and invulnerability ideations more susceptible to indoor tanning. Further research is necessary to delineate contexts or circumstances under which developmental factors affect indoor tanning intentions. Taking this study further to examine the role of developmental variables in other sun risk

behaviors (such as, spending excessive time in the sun, not wearing protective clothing) will be the logical next step.

In terms of practical implications, this study demonstrates that design and evaluation of school interventions to reduce tanning bed use must be targeted to adolescents varying in imaginary audience ideations differently. It may be therefore, particularly useful to conduct an assessment of the intervention participants prior to intervention administration, and determine the types of risk messages that may be most useful for the particular individual. For instance, interventions designed to dissuade adolescents high in imaginary audience ideations may focus on more immediate appearance-related effects of tanning bed use (such as burns, scars, and premature wrinkling) while interventions for adolescents high in invulnerability ideations may utilize more tailored approaches to increase their vulnerability, and highlight the high risks associated with indoor tanning.

Future research

Future research should examine whether imaginary audience and personal fable ideations lead to other risk behaviors related to skin cancer such as deliberate sun exposure and minimal use of protective clothing when out in the sun. As well, the role of imaginary audience ideations in other risky attractiveness-enhancement behaviors besides indoor tanning (such as disordered eating) can be explored. This study has provided insight into one set of pathways through which imaginary audience and invulnerability dimension of personal fable ideations are associated with indoor tanning intentions. Future studies should delineate pathways that link other unidentified factors that may be important in understanding indoor tanning. Finally, an exploration of attitudinal and social factors that may discourage adolescent indoor tanning will help us gain insight into how to develop campaigns and interventions for reducing adolescent indoor tanning.

Most of the research to discourage indoor tanning has focused on educating the users about appearance-related dangers of tanning, but at the same time it is also necessary to acknowledge the appearance-related motivations for tanning (Cafri et al. 2009). Adolescent motivations for tanning bed use may not just be appearance-related, but also social ('My

Table 3. Zero-order correlation matrix for all variables.

	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Imaginary audience	1.00								
2. Omnipotence	-.32**	1.00							
3. Uniqueness	.10*	-.16**	1.00						
4. Invulnerability	-.17**	.28**	.09*	1.00					
5. Association	.04	.08	-.07	.16**	1.00				
6. Pro-tanning attitude	.22**	.03	-.07	.12**	.38**	1.00			
7. Intention	.17**	.02	-.09*	.13**	.49**	.55**	1.00		
8. Sex (female)	.28**	-.11**	-.01	-.17**	.21**	.19**	.32**	1.00	
9. Past tanning bed use	.07	.07	-.10*	.05	.48**	.44**	.72**	.33**	1.00

Note: Sex 0 = male, 1 = female; past tanning bed use 0 = No, 1 = Yes.

* $p < .05$; ** $p < .01$.

friends do it, so I want to do it') or motivated by media ideals ('my favorite stars on Jersey Shore reality television look beautiful and tanned'). Better understanding of adolescent motivations may help us uniquely craft anti-tanning messages that will not just appeal to them, but motivate them to consider other alternatives to tanning, while aiming to respect their desire for appearance-enhancement.

Notes

1. In order to verify and triangulate the results, we also employed SEM. The SEM models tested comparative utility of adolescent egocentrism (imaginary audience and personal fable ideations) for understanding indoor tanning intentions, along with the mediating roles of pro-tanning attitude and association with peers who use tanning beds. We employed maximum likelihood SEM to evaluate our hypotheses. The first step required calculation of the error variance ($1-\alpha$) (σ^2) of each multiple-item variable to account for unreliability within our measures (Bollen 1989). We created our structural model by constructing the paths predicted by our hypotheses (Figure 1). Given that no significant association was observed for omnipotence, uniqueness, and invulnerability with intention to use tanning beds (Table 3), we dropped the insignificant paths. Results of the SEM indicated that our original model adequately fit the data, $\chi^2(7) = 15.12$, $p < .05$, Comparative fit index = .97, Root mean square error of approximation = .05. Details are available from the first author.
2. We performed additional analyses to test for alternate models. Using bootstrapping procedures, we conducted mediation analysis to examine the following paths (and none of these models were significant): imaginary audience to association with peers who tan to indoor tanning intentions, omnipotence to pro-tanning attitude to indoor tanning intentions, uniqueness to pro-tanning attitude to indoor tanning intentions, and invulnerability to pro-tanning attitude to indoor tanning intentions. Details are available from the first author.

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