

# Influence of Parent and Child Characteristics on a Parent-Based Intervention to Reduce Unsafe Sun Practices in Children 9 to 12 Years Old

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**Objective:** To identify familial characteristics that may have influenced the effectiveness of a parent-based intervention to reduce unsafe sun practices in children aged 9 to 12 years (fourth through sixth grades).

**Design:** Randomized control design with a 30-day follow-up.

**Setting:** Participants were recruited from 2 distinct regions in the United States: southern Idaho and eastern Tennessee.

**Participants:** Three hundred forty children were assigned to the experimental group in which the parents received the intervention materials. One hundred twenty-nine respondents were assigned to the control group.

**Intervention:** The intervention provided materials that encouraged parents to communicate skin cancer risks,

promote sun-safe behaviors, and discourage high-risk sun-related behaviors.

**Main Outcome Measures:** Outcome measures included sunburn frequencies, sunburn severity, and sunbathing tendencies. The moderator variables were positive characteristics of the parent-child relationship, levels of negative communication, parental monitoring, and child compliance.

**Results:** Sunburn frequency, sunburn severity, and sunbathing tendencies were most effectively reduced when the quality of the parent-child relationship was high, the child exhibited high levels of compliance, and there were low levels of negative communication.

**Conclusion:** The findings of this study provide evidence that parents can be viable change agents for child behaviors and that the quality of the family relationship is critical to the success of such interventions.

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**T**HE INCREASING INCIDENCE of skin cancer is a major concern for dermatologists and health-oriented researchers. Current estimates suggest that 1 in 6 individuals will develop a form of skin cancer during their lifetime.<sup>1</sup> The increase in skin cancer cases has been widely attributed to the various forms of high-risk sun exposure, such as intentional sunbathing, inadequate sun protection, and the use of tanning lamps or salons by young individuals.<sup>2</sup> Nearly all recent approaches have focused on implementing interventions while children are in school or community settings.<sup>3</sup> However, widespread rates of dangerous intentional sun exposure and low rates of sun-protective behavior continue to be reported in young people.

Despite the evidence that generally supports the importance of parenting variables and parent-based interventions,

few sun protection studies in young people have adopted such approaches. One recent study<sup>4</sup> that reached children while at home via their parents found evidence that a parent communication-based intervention could reduce sun-tanning tendencies and sunburns and increase preventive activities (eg, sunscreen use). Specifically, the intervention was a parent-based handbook that contained sections on the overview of the incidence of skin cancer, developmental changes that occur from childhood to adolescence, how to build a strong parent-child relationship, specific strategies that parents can use to improve communication channels, methods of teaching assertiveness skills, and in-depth discussion of how to reduce skin cancer risk (eg, who is most at risk, the effects of UV rays, myths about sunburns and skin cancer, alternatives to sun-related activities, and methods of

protection). Parents were asked to read the handbook and engage in conversations with their children during the last weeks of May, and children's behaviors were assessed 45 days later in July. Although the intervention found that children in the treatment condition had significantly fewer and less severe sunburns, engaged in less frequent intentional sunbathing, had more positive attitudes about sunscreen and sunblock use and less positive attitudes about tanning and tanned appearance, and were less influenced by peers regarding their sun safety beliefs, the question remains of whether it is only what parents have to say or how they might say it that counts when trying to convey health information to children. This implies that the effectiveness of the intervention may be influenced, in part, by individual characteristics of the parents and children.

In the present study, we focus on characteristics of the parent-child relationship that could moderate the child's sun-related behaviors and thus the effectiveness of the intervention. The moderator variables examined were the general positive characteristics of the parent-child relationship, negative communication within the home, the level of parental monitoring with the child, and the child's level of compliance with parental authority. We anticipate that when parents do not engage in negative communication practices (eg, lecturing rather than listening, nagging at the child, and turning everything into a debate), the intervention should be more efficacious. We expect that the separation between the treatment and control groups will also be higher when parents exhibit positive parental attributes, such as warmth, understanding, trust, and unconditional love, and use high levels of monitoring with the child and when the child shows high levels of compliance.

## METHODS

### SAMPLE

The sample consisted of 469 parent-child dyads. The ages of the children ranged from 9 to 12 years (fourth through sixth grades). Three hundred forty respondents were assigned to the experimental group in which the parents received the intervention materials. One hundred twenty-nine respondents were assigned to the control group. Participants in each group were recruited from 2 distinct regions in the United States: southern Idaho and eastern Tennessee. All the names of children attending public and private elementary schools in these regions were put into an Excel file and given a 6-digit random identification number. The file was then sorted on the random identification number. After the sorting, individuals were alternately assigned to either the treatment or control conditions. All randomizations took place before the start of the study. Previously published studies suggested that rates of sunbathing and sunburns were high enough to warrant examination of samples drawn from these 2 regions.<sup>5</sup>

### RECRUITMENT

To acquire an adequate number of respondents aged 9 to 12 years, children's names were randomly selected from all elementary and middle school yearbooks of public and private schools in Boise, Idaho, and Johnson City, Tenn. (This ap-

proach has been used to develop sampling lists in our previously funded research.)<sup>4</sup> These areas cover diverse regions of the country, which vary considerably in terms of rural, urban, and suburban school districts. Next, the last names of students were matched to local telephone directories to obtain the parents' names, telephone numbers, and mailing addresses. We initially contacted the parents of the students by telephone and explained that we were doing a research project that dealt with parent-child communication. At that time, it was determined whether the parent had a son or daughter of the appropriate age. If so, they were asked 2 unrelated questions that allowed us to later compare parents who participated with those who did not (ie, "Do you think that the speed limits should be raised on major highways from 75 to 85?" and "Do you think that most people wear their seatbelts?"). After these questions, the parents were asked if we could send them a letter describing a larger study that they would be invited to participate in. Both parents and children were asked to sign separate consent forms before participation.

Child respondents were offered \$20 for pretest participation and \$25 for posttest participation. Each target parent was offered \$40 for participation. All payments were made on completion of the study. We had a high participation rate for parents and children (85% and 99%, respectively) and a small number of families who initially agreed to be in the study but dropped out (n=12), but these patients were evenly distributed across groups. We observed no significant demographic or general attitude biases when we compared parents who agreed to participate in our study with those who were unwilling to do so. We also found no significant differences when comparing the treatment groups with the control group regarding background characteristics (**Table**). Child respondents in the groups were matched based on sex, age, and school. No significant differences in these variables were found across groups. The institutional review boards of both Boise State University and East Tennessee University approved the research.

## INTERVENTION AND OUTCOME MEASURES

Parents in the experimental groups were given the handbook at the beginning of the summer (the last 2 weeks in May and the first 2 weeks in June). Parents were then asked to read all the materials and implement the intervention with their children during this period, with the assessments of the children approximately 45 days after. This posttest interval was selected to provide the parents with 2 weeks to read the handbook and talk with their children and approximately 30 days for postannual conversations. Participants in the control group did not receive the intervention materials but were given a posttest assessment during the same interval as the experimental group. All respondents were offered payment in appreciation of their participation.

All outcome measures were derived from the previous literature that examined sun-risk tendencies in elementary-aged schoolchildren.<sup>3,4</sup>

### SUNBURN FREQUENCIES

The 4 questions used to assess sunburn frequencies asked the child participants to estimate the number of times their skin had become red owing to sun exposure (eg, "How many times in the past 30 days has your skin become red because of exposure to the sun?" and "How many times in the past 30 days has your face become red because of exposure to the sun?"). The remaining 2 questions were identically phrased with the exception that they inquired about the arms and neck. These

open-ended items were averaged to create an index of sunburn frequencies. High item intercorrelations were observed ( $\alpha = .92$ ).

### SUNBURN SEVERITY

Four questions measured the child's sunburn severity by asking the child to rate the general severity of his or her most recent sunburn, the degree that the sunburn peeled, the amount of pain associated with the sunburn, and the level of difficulty the child had sleeping because of the sunburn (eg, "How would you describe the severity of your most recent sunburn?" and "Please estimate how painful this sunburn was"). All responses were measured on a 4-point Likert scale, where 1 represented not at all, 2 represented slightly, 3 represented moderately, and 4 represented extremely. Responses were averaged to derive an index of sunburn severity owing to their high interitem correlations ( $\alpha = .78$ ).

### SUNBATHING TENDENCIES

Sunbathing tendencies were assessed using 4 questions drawn from the literature.<sup>6</sup> These questions asked the child about intentional sunbathing, lying out in the sun to get a tan, and lying out in the sun to get color in the skin (eg, "In the last month, approximately how many times did you lie out in the sun to get a tan?" and "Within the past 2 months, how often did you lie out in the sun to get some color in your skin?"). Responses were standardized and averaged to create an index of sunbathing tendencies ( $\alpha = .85$ ).

### MODERATOR VARIABLES

#### Parent-Child Relationship

Thirteen questions were used to measure the quality of the parent-child relationship. These questions measured general positive parental attributes, including warmth, unconditional love, understanding, trust, and other positive traits. The measures were developed by Jaccard and Dittus<sup>7</sup> for adolescents. All questions were based on a 5-point scale (1 indicating almost never; 2, sometimes; 3, a moderate amount; 4, quite often; and 5, almost all of the time). High intercorrelations were observed for the combined group ( $\alpha = .94$ ).

#### Negative Communication

Two items were used to measure the level of negative communication within the home. The first assessed how often the parent lectured rather than listened to the child. The second measured how often the parent turned communications into a debate of "me vs you." Both questions were measured on a 5-point scale and exhibited high interreliability ( $\alpha = .64$ ).

#### Parental Monitoring

Three questions were used to assess the level of monitoring that the parent uses with the child. These questions asked the child to rate how often the parents typically know where he or she is, as well as if the parents know where the child is going in different situations (eg, "In general, how often does your mother know where you are?" and "I tell my mother or father where I am going after school"). All questions were measured on a 5-point scale. The averaged index of combined questions exhibited high intercorrelations ( $\alpha = .80$ ).

**Table. Demographics by Study Group**

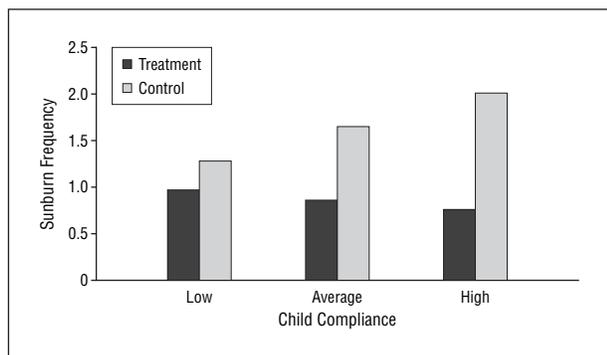
Characteristic	Control, % (n = 129)	Treatment, % (n = 340)
Child's sex		
Male	47.0	51.6
Female	53.0	48.4
Parent's sex		
Female	88.3	85.6
Male	11.7	14.4
Parent's religion		
Protestant	26.3	42.3
Catholic	26.3	16.9
Latter-Day Saint	9.2	6.4
Christian	7.9	4.0
None	6.6	6.7
Other	23.7	23.7
Parent's race		
White (non-Hispanic)	97.4	93.1
African American	0.0	2.1
Asian/Pacific Islander	0.0	2.1
Hispanic/Latino	1.3	0.9
Other	1.3	1.8
Parent's socioeconomic status		
Much higher than most families	5.3	4.8
Moderately higher than most families	30.3	28.6
About average	56.6	59.3
Moderately lower than most families	7.9	6.6
Much lower than most families	0.0	0.6
Parent's educational level		
High school education or less	15.6	13.6
Some college education but no degree	27.3	25.7
2-Year college degree	18.2	16.3
4-Year college degree	26.0	31.4
Postbaccalaureate degree	12.9	13.0

#### Child Compliance

The child's compliance toward parental demands was measured by 3 questions. These questions assessed how often the child follows his or her parent's orders (eg, "When your mother tells you to do something, how often do you obey?" and "How often do you follow the rules your mother sets?"). Questions were based on a 5-point Likert scale. Items were averaged to derive an index of child compliance owing to their high interitem correlations ( $\alpha = .82$ ).

#### Statistical Analyses

The results are organized in terms of the analysis of the outcome variables: sunburn frequency, sunburn severity, and sunbathing tendencies. Regression analyses were conducted to predict these outcome variables individually based on the work of Jaccard and Turrissi.<sup>8</sup> First, all the moderator variables were centered. This transformation has no substantive effect on the analytic outcomes but improves the interpretability of the analyses. Second, product terms were computed between group membership and the mean centered moderator variables (ie, parent-child relationship) to be able to assess the influence of the interaction effect. Finally, the analyses regressed an outcome (sunburn frequencies) onto all 3 terms (group, mean-centered moderator variable, and the product term) simultaneously into the model to determine the presence of an interaction effect. To assess the presence of a significant interaction effect, we examined the bootstrapped 95% confidence intervals (CIs) around the regression coefficient of



**Figure 1.** Thirty-day sunburn frequency at low, average, and high child compliance.

the moderator variable. The bootstrapped CIs were derived by conducting the analyses using 2000 bootstrap samples with the AMOS 5.0 program in SPSS statistical software (SPSS Inc, Chicago, Ill). Given that the regression coefficient for the product term provides an estimate of the relationship between the interaction term and the outcome, if the CIs around the regression coefficient contained the value of zero, the effect was considered to be not significantly different from zero or nonsignificant.

To evaluate the nature of the interactions, we examined the effect of group membership on a given outcome for average scores on the moderator variables, above-average scores on the moderator variables, and below-average scores on the moderator variables. This was accomplished by subtracting scores associated with +1 SD or -1 SD on the moderator variable, recalculating the product terms, and then rerunning the analyses separately to assess above-average and below-average scores on the moderator variables.

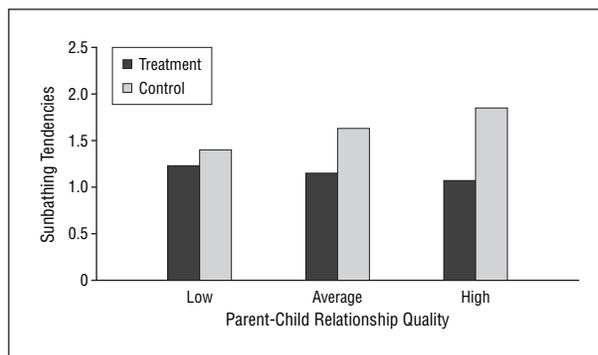
## RESULTS

### STUDY PARTICIPANTS

When comparing the parents who agreed to participate with those who were unwilling to do so, no significant demographic or general attitude biases were observed. Also, no significant differences were found when comparing the treatment groups with the control group for background characteristics (Table).

### SUNBURN FREQUENCY

One moderator variable found to significantly influence the relationship between group and sunburn frequency was the child's level of compliance ( $\beta \pm SE = -0.59 \pm 0.25$ ; 95% CI, -1.3 to -0.06;  $P < .05$ ). Regression analyses revealed that sunburn frequencies varied at different levels of child compliance (**Figure 1**). At an average level of child compliance, the treatment group had significantly lower frequencies of sunburn than the control group. When the child had an above-average level of compliance, the difference in sunburn frequency between the treatment and control groups was even larger. The smallest difference between the treatment and control groups was observed when the child was below average in compliance. These results imply that as child compliance increases, so does the



**Figure 2.** Thirty-day sunbathing tendencies at low, average, and high parent-child relationship quality.

effectiveness of the intervention. No other significant parent moderator effects were observed for sunburn frequency.

### Sunburn Severity

One moderator variable found to significantly influence the relationship between groups and sunburn severity was the level of parental monitoring ( $\beta \pm SE = 0.31 \pm 0.08$ ; 95% CI, 0.12 to 0.50;  $P < .05$ ). The differences between groups for sunburn severity varied depending on how much the parent monitored the child. For example, at an average level of parental monitoring, there was a 0.13 difference in sunburn severity between the 2 groups. This difference decreased to 0.10 at an above-average level of monitoring and increased to 0.37 at below average. Thus, the intervention is most critical when parents are below average in monitoring. No other significant parent or child moderator effects were observed.

### Sunbathing Tendencies

Sunbathing tendencies were found to be the most influenced by moderator variables. In fact, 3 of the 4 moderator variables significantly influenced the relationship between group and sunbathing: the quality of the parent-child relationship ( $\beta \pm SE = -0.39 \pm 0.18$ ; 95% CI, -0.70 to -0.08;  $P < .05$ ), the child's level of compliance ( $\beta \pm SE = -0.55 \pm 0.17$ ; 95% CI, -0.91 to -0.23;  $P < .05$ ), and the amount of negative communication ( $\beta \pm SE = 0.28 \pm 0.14$ ; 95% CI, -0.00 to 0.60;  $P < .05$ ). First, in comparing the quality of the parent-child relationship, different levels of the moderator variable revealed varying results (**Figure 2**). For example, at average levels of relationship quality, the treatment group was significantly lower in sunbathing tendencies. When the relationship was above average, an even greater difference was observed. The smallest differences were observed when the relationship was below average. This implies that the greater the quality of the parent-child relationship, the greater the chance the intervention has of being effective. Second, differences were observed for different levels of child compliance. When the child was average in compliance, sunbathing tendencies were lower in the treatment group. This difference was even greater when the

child was above average and smaller when the child was below average in compliance. The implications from this are similar to the effects of compliance on sunburn consequences; as the child's level of compliance increases, so does the efficacy of the intervention. Finally, as predicted, negative communication has an opposite relationship in regard to sunbathing tendencies. The highest differences between groups were observed when the parent was below average in negative communication. This was followed by an average level, with the smallest difference existing when the parent was high in negative communication. Thus, the intervention has the greatest chance of being successful when the parent is low in negative communication.

## COMMENT

Children have been identified as important targets for skin cancer prevention efforts. Research in other behavioral domains has shown that children are more likely to listen to their parents in the context of a more connected, warm, loving, and trusting environment.<sup>9</sup> Parents who engage in negative communication methods tend to negate any beneficial effect that might come from more general positive parenting practices.<sup>10</sup> Studies in a wide context of risk behaviors routinely demonstrate the importance of parental monitoring in child behaviors. Differences in children's self-disclosure and compliance with parental authority were related to their risk behaviors. In this study, sunburn frequency, sunburn severity, and sunbathing tendencies are most effectively reduced when the quality of the parent-child relationship is high, the child exhibits high levels of compliance, and there are low levels of negative communication in the home. These results were consistent with the original hypotheses.

The analysis of parental monitoring did not support our hypothesis that the highest differences between groups would exist when parents were above average in monitoring. However, analyses revealed that the treatment group was actually higher than the control group for sunburn severity when parents were above average in monitoring and that the greatest difference between groups existed when the parents were below average in monitoring. This may be because parents who highly monitor their children are already more aware of their child's sun exposure. Thus, the intervention is most critical for families who have low levels of monitoring in the home.

Theoretically, these findings are consistent with practical views of family relationships. Since the intervention was parent based, it follows that if the child feels that the parent encompasses many general positive qualities (eg, the parent is warm, loving, trusting, and a good listener and shows respect for the child), the child will be more likely to listen to his or her parents about issues such as skin cancer risks. Furthermore, if the child is willing to comply with parental demands, the parent will have more influence in encouraging sun-safe behaviors and discouraging unsafe sun-related behaviors. Also, it is important that the parent does not

exhibit negative communication patterns that can negate the effectiveness of positive communication. Finally, when parents are already aware of their child's activities, they are more capable of making sure that their child is adequately protected from the sun, which can prevent severe burns.

Study limitations include the evaluation of only short-term effects of the parent-based intervention, and the analyses did not account for interactions between the moderator variables themselves. Future research should be conducted to evaluate whether the promising results observed in the short term will result in stable behavioral change and should focus on the interactions between the moderator variables. Other limitations include that we did not measure the skin type of the consenting parents and that we studied only 1 child per family. For the former, we were concerned about response burden on individuals and tried to keep the measures as brief as possible. Future studies could focus on more family-related risk characteristics. For the latter, we considered asking the parents to talk to all of their children but decided to reduce the burden of the study on parents with multiple children. We think that parents were likely to have conversations with all of their children whether they were asked or not.

Parents can be viable change agents for child behaviors, and the quality of the family relationship is critical to the success of such interventions. In 2004, Turrisi et al<sup>4</sup> revealed that parent-based approaches could reduce risky behaviors that lead to skin cancer. This study shows that individual characteristics of families play a vital role in the success of interventions. Physicians can adapt elements of effective parent-child communication to improve patient-physician communications and enhance patient compliance with practicing sun safety (eg, setting a general positive health care environment, ceasing negative communication such as lecturing rather than listening, and continuous monitoring of the desired behavior). Although dermatologists have tried to enlist parents in promoting sun protection practices to their children, the effort has had variable results, with children continuing to experience sunburn.<sup>11</sup> Future research should explore ways dermatologists can target families who will most benefit from this parent-based intervention.

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**Author Contributions:** Dr Turrisi takes responsibility for the integrity of this article. *Study concept and design:* Turrisi, Hillhouse, and Robinson. *Acquisition of data:* Turrisi, Hillhouse, and Adams. *Analysis and interpretation of data:* Turrisi, Adams, and Stapleton. *Drafting the manuscript:* Turrisi, Adams, and Stapleton. *Critical revision of the manuscript for important intellectual content:* Robinson, Hillhouse, and Stapleton. *Statistical analysis:* Turrisi.

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## Correction

**Errors in Text and Acknowledgment.** In the Study by Mentink et al titled "Randomized Controlled Trial of Adjuvant Oral Dexamethasone Pulse Therapy in Pemphigus Vulgaris: PEMPULS Trial," published in the May issue of the ARCHIVES (2006;142:570-576), the number of oral doses was inadvertently misstated in the "Study Protocol" subsection of the "Methods" section on page 571. In the second paragraph, the fourth sentence should have read as follows: "During pulse visits, 6 oral tablets of 50 mg of dexamethasone, or 6 tablets of placebo (which were both specially produced to be identical in taste and smell and were tested for this study)<sup>18</sup> were given on 3 consecutive days every 4 weeks." In addition, the academic degree for Dédée Murrell, in the last line of the Acknowledgment on page 576, should have been listed as MD. Online versions of this article on the *Archives of Dermatology* Web site were corrected on May 23, 2006.