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## Patient Education and Counseling

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### Research Paper

# A novel educational intervention targeting melanoma risk and prevention knowledge among children with a familial risk for melanoma

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### ARTICLE INFO

#### Article history:

Received 18 March 2017

Received in revised form 6 October 2017

Accepted 14 October 2017

#### Keywords:

Melanoma

Prevention

Educational intervention

Children, families

Risk communication

### ABSTRACT

**Objective:** To examine the acceptability of and preliminary effects associated with a novel educational intervention for children at elevated risk for melanoma. The intervention incorporated information on mechanisms through which melanoma preventive behaviors mitigate risk for melanoma and was delivered to parents and children concurrently.

**Methods:** Twenty-two parents (with a personal history of melanoma or spouse with a history of melanoma) and 33 children (mean age 11.8 years) were asked to complete questionnaires immediately prior to and after an educational session and at a one-month follow-up.

**Results:** Both parents and children endorsed that the educational materials were acceptable. Knowledge about melanoma risk and preventive and screening behaviors increased significantly. Children's perceived risk for melanoma increased significantly, while parents' perceptions of children's risk started at a higher level and remained constant. There were significant increases in reported engagement in sun protective behaviors.

**Conclusion:** The educational intervention shows promise in terms of its acceptability and effects on participant knowledge, perceived risk, and engagement in melanoma preventive behaviors.

**Practice implication:** Children at elevated risk for melanoma and their parents may benefit from receiving educational information on their disease risk and strategies for prevention and screening.

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## 1. Introduction

Children who have a familial risk for melanoma, such as those with a parent with a history of melanoma, are at increased risk for the disease. For instance, individuals who have a first-degree relative with a history of melanoma have a 2-fold risk for the disease, and individuals with inherited mutations in the principal melanoma predisposition gene CDKN2A have a 25–50% lifetime risk [1–4]. Melanoma preventive behaviors that reduce ultraviolet radiation (UVR) exposure and the occurrence of sunburns include

use of sunscreen and/or protective clothing, minimizing UVR exposure during peak hours (10 am–4 pm), and avoidance of intentional tanning [5]. Implementation of such preventive behaviors during childhood, particularly among at-risk populations, is especially critical given that UVR exposure and sunburn occurrence early in life are modifiable risk factors for melanoma later in life [6–9].

Unfortunately, children who have a familial risk for melanoma are sub-optimally adherent to recommended melanoma preventive behaviors [10–12]. While approximately 70–79% of children at increased familial risk use sunscreen regularly, shade-seeking and protective clothing use occur less frequently (23–37% for shade-seeking; 8–33% for hat and sunglass use). In addition, parents reported that 28% of children at-risk for melanoma sustained

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sunburns in the last 6 months and 43–49% in the last year [10–12]. Some studies have begun to identify potential reasons for poor engagement in preventive behaviors, including older child age, lower parental intentions to protect children from the sun, and children's lack of knowledge or awareness about how preventive behaviors implemented during childhood could affect melanoma occurrence later in life [10–12].

The findings above highlight the need for melanoma preventive interventions targeting children who are at elevated risk for the disease, including interventions that communicate children's genetic risk for melanoma and the ways in which implementing preventive behaviors could mitigate familial risk [13]. The only intervention, to our knowledge, that has provided melanoma prevention information to children who have a familial risk for the disease was conducted by Gritz and colleagues [14,15]. Specifically, the intervention consisted of 3 postal mailings to melanoma survivors and their children under age 12. The materials included survivors' experiences with and modeling of sun protective behaviors with their children and an activity booklet for children on sun protective behaviors. The intervention led to improvements in sunscreen application 1-month post-intervention and wide-brimmed hat use 4-months post-intervention, but no significant improvements in other behaviors. One potential method for building the intervention literature focused on this at-risk population is to provide families with education on the mechanisms through which melanoma preventive behaviors mitigate children's risk for the disease. Marteau and Weinman have hypothesized that provision of genetic risk information will have a larger impact on behavior change if the risk information is accompanied by information on the interactions between genetic and environmental factors contributing to disease [16].

The goals of the current study were to examine the acceptability of and preliminary effects associated with a novel educational intervention for children who have a familial risk of melanoma. The intervention was designed to provide developmentally appropriate information on children's elevated risk for the disease based on their family history and to demonstrate how melanoma preventive behaviors could mitigate this risk. We hypothesized that families would find the educational materials to be acceptable, and that the materials would lead to increased knowledge, perceptions of children's risk for melanoma, intentions to engage in melanoma preventive behaviors, and reported engagement in preventive behaviors over time.

## 2. Methods

### 2.1. Participants and procedures

Parents of children ages 8–17 years were invited to participate if they or the child's other parent had a history of melanoma, and thus their children had a 2-fold risk for melanoma. Children were eligible to participate if they were between the ages of 8–17 years (and had a parent with a history of melanoma). The 8–17 year age range was selected to enable children to complete self-reported measures and to maximize potential for their meaningful interaction with the educational content provided [17–22]. Eligible families were recruited through a registry from a prior study including parents with a history of melanoma and their children. Those families had largely been recruited from a comprehensive cancer center in the Mountain West. Of the 73 families contacted, 18 participated (recruitment rate=25%), which included 22 parents and 33 children.

Families were invited to attend an in-person educational session in a university setting. Parents provided written informed consent and parental permission and children provided written assent. All participants were asked to complete study

questionnaires immediately prior to and after reviewing the educational materials, and at a follow-up 1 month later (100% retention between the first and last timepoints). All study procedures were approved by the University of Utah Institutional Review Board (protocol 00086073).

### 2.2. Educational intervention

Two master's-level research assistants (each with a Master's in Public Health) delivered the single-session, in-person intervention (Melanoma Education and Risk Information Team, MERIT), lasting approximately 30 min to each family. MERIT provides information on melanoma risk and prevention, including foundational information on traits and the environment, DNA and genes, mutation, melanoma development, regulation of cell growth, genetic and environmental risk, and melanoma prevention and control [23]. MERIT consists of visuals delivered through PowerPoint and short videos, and the still visuals are accompanied by brief text. The educational materials were grounded in Protection Motivation Theory and Marteau and Weinman's expansion on the Common-Sense Model of Self-regulation and Illness [16,24], both models that have been applied to other pediatric populations [25,26]. Specifically, based on Protection Motivation Theory, the materials targeted perceived vulnerability and response efficacy, and based on the Common-Sense Model, the materials included information on the mechanisms underlying melanoma risk reduction [23].

### 2.3. Measures

Both parents and children were asked to complete questionnaires (available from the first author on request). Parents' and children's perceptions of the *acceptability* of the educational materials were assessed immediately after they viewed the educational materials using 17 items on a 5-point Likert scale ranging from "strongly disagree" to "strongly agree" adapted from prior studies [27–29]. Items assessing perceived exaggeration of risk and prevention information were created for the current study or adapted from prior work [30]. Items assessing personal applicability of the information provided were adapted from a prior study on melanoma prevention among high-risk families [31].

Children's and parents' *knowledge* was assessed using an investigator-designed questionnaire with 28 true/false items for parents and 29 items for children. Five knowledge subscales were developed: foundational concepts of DNA and mutation, development of melanoma, understanding of genetic and environmental risk, and prevention strategies. The knowledge items were designed by the research team to assess knowledge of the learning objectives covered in MERIT. Knowledge scores were calculated by assigning a "1" to correct answers and a "0" to incorrect answers, and summing the item scores.

Parents' and children's perceptions of children's risk for melanoma were assessed using 2 items [32] on absolute risk (i.e., lifetime risk for melanoma on a 5-point scale from "very unlikely" to "very likely") and relative risk (i.e., risk for melanoma compared to peers on a 5-point scale from "a lot less likely" to "very likely").

Parents and children were asked to report on their *intentions* for children to engage in melanoma preventive and screening behaviors. Intentions were assessed on a 5-point scale ("No, and I do not plan to start doing so in the next 6 months" to "Yes, I have been, but for more than 6 months") adapted from previous studies based on the Transtheoretical model [33,34].

We assessed children's *reported engagement in melanoma prevention and screening behaviors* based on parent- and child-

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