Exploring Relations Between Positive Mood State and School-Age Children’s Risk Taking

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Objective To examine whether children engage in greater risk taking when in a positive versus neutral mood state, and whether positive urgency trait relates to risk taking. Methods Positive mood in 7–10-year-old children was induced experimentally, and children’s risk-taking intentions and actual behaviors were measured when the child was in a positive and neutral mood state. Results Within-person comparisons revealed that children showed greater risk-taking intentions and actual risk behaviors when in a positive mood state compared with a neutral one. Positive urgency was associated with greater risk taking when in a positive mood state, and this effect was stronger in the actual risk taking than intentions to risk take task. Conclusions Mood state affects children’s risk taking. Positive mood is associated with greater risk taking in elementary-school children, and those high in positive urgency are especially likely to show this effect. Implications for injury prevention are discussed.

Key words children; injury risk; mood induction; positive mood; risk taking.

Overview

Unintentional injury is a leading cause of death and hospitalization for children in most developed nations (National Center for Injury Prevention and Control [NCIPC], 2011; World Health Organization [WHO], 2008). In the United States in 2009, for example, unintentional injury accounted for 36.5% of all deaths to youth 1–19 years of age and was the leading cause of child mortality (Kochanek, Kirmeyer, Martin, Strobino, & Guyer, 2012). Fortunately, evidence suggests that up to 90% of injuries to children are preventable (Philipppakis et al., 2004; Rimsza, Schackner, Bowen, & Marshall, 2002; Safe Kids Canada, 2010). Understanding factors that lead children to engage in injury-risk behaviors is essential for developing effective strategies to mitigate these behaviors. Addressing this issue, the current study examined the relation between children’s mood state and their risk taking, and considered whether the personality trait of positive urgency impacts this relation.

Factors That Influence Children’s Risk Taking

Elementary-school children experience many injuries when they are away from home, unsupervised, and making their own decisions about injury-risk activities (Morrongiello, 1997; Shanon, Bashaw, Lewis, & Feldman, 1992). Past research has documented that both temperament and cognitive factors influence physical risk taking (i.e., engaging in a behavior that increases risk of injury when there are alternatives that pose less injury risk) among children (Morrongiello & Rennie, 1998; Peterson, Brazeal, Oliver, & Bull, 1997; Schwebel & Gaines, 2007). For example, children who score high in the trait of sensation seeking (i.e., seek varied, intense, and novel experiences even if these involve risk of injury) or low in inhibitory control (i.e., capacity to inhibit inappropriate or undesirable behavior, such as being able to resist touching hazards that are off limits but interesting) engage in more risk taking. In fact, these temperament influences on risk behaviors are found even in children as young as 2–5 years of age.
Cognitive appraisals of injury risk that influence children’s risk decisions include personal vulnerability, potential injury severity, and danger. Children who judge their personal vulnerability for injury, the potential severity of injury, or danger in a situation as low engage in greater risk taking (Morrongiello & Matheis, 2004; Morrongiello & Rennie, 1998; Peterson et al., 1997). Individual-difference traits and cognitive appraisals of injury risk, therefore, are important determinants of children’s risk taking. Much less is known, however, about emotional or mood influences on risk taking during early childhood, even though these factors have been shown to be important determinants of risk behaviors at older ages.

For adolescents and adults, positive mood has been linked to an increase in a number of health-risk behaviors, including alcohol consumption, illicit drug use, gambling, and unsafe sexual practices (Cooper, Agocha, & Sheldon, 2000; Holub, Hodgins, & Peden, 2005; Loewenstein, Weber, Hsee, & Welch, 2001). For elementary-school children, individual differences have been reported for emotional reactions to simulated injury-risk play situations, with some children reacting predominantly with excitement and others with fear (Cook, Peterson, & DiLillo, 1999; Morrongiello & Sedore, 2005; Peterson, Gillies, Cook, Schick, & Little, 1994). In addition, children’s expectations of fun and excitement have been shown to predict their intentions to engage in risk behaviors: The more fun and excitement children expect to experience, the greater their intentions to engage in risky play activities despite awareness of the potential for injury (Morrongiello & Matheis, 2007a). Related to this, when children observe peers engage in risky play activities and communicate positive emotions as they do so (e.g., smiling), they are more likely to change their own practices in favor of imitating the risk behaviors observed (Morrongiello & Rennie, 1998). These studies confirm that children are attentive to emotions in risk situations and they are motivated to engage in risk behaviors when situational factors suggest that fun will result. What remains to be determined, however, is how being in a positive mood state affects school-age children’s injury-risk behaviors. Specifically, the current study examined whether being in a heightened positive mood state leads children to engage in greater risk taking than they do when in a neutral mood state.

An additional aim of this study was to examine whether the individual-difference attribute of positive urgency relates to children’s risk taking. Positive urgency is an emotion-based disposition or trait that is distinct from impulsivity and reflects an individual’s tendency to engage in rash and ill-advised actions when in a positively aroused mood state (Cyders & Smith, 2008). Linking from emotions to behaviors reflects normative processes, and emotions often signal the need for some type of action (Hajcak et al., 2007; Maxwell & Davidson, 2007). However, those high in positive urgency show more extreme reactions to aroused positive mood states, leading to more extreme, risky, and potentially harmful behaviors. For example, among university students and adults, positive urgency relates to problem alcohol consumption (quantity, frequency, drunkenness), problem gambling, unsafe sexual behaviors, illicit drug use, and risky driving, and even predicts who is likely to show these behaviors over time (Cyders & Smith, 2007; Cyders et al., 2007; Pearson, Murphy, & Doane, 2013; Stautz & Cooper, 2014; Zapolski, Cyders, & Smith, 2009). The premise is that intense emotions interfere with rational decision making (Bechara, 2004, 2005; Dolan, 2007; Dreisbach, 2006; Shiv, Loewenstein, Bechara, Damasio, & Damasio, 2005) and lead to more focus on immediate goals (e.g., having fun) rather than longer term goals, such as being safe (Davidson, 2003). To date, although recent research has shown that children who are poor at regulating their emotions generally engage in greater risk taking (Morrongiello, Kane, McArthur, & Bell, 2012), researchers have not explored whether positive urgency can be measured during childhood and if it impacts children’s risk taking when in a heightened positive mood state. These questions were addressed in the current study.

**Present Study**

There were two challenges to be overcome to examine the impact of positive mood state on school-age children’s injury-risk behaviors. First, a reliable way to induce a positive mood state had to be developed. Second, a valid measure of children’s physical risk taking was needed.

**Mood Induction**

The difficulty in researching naturally occurring events that evoke positive mood has prompted the popularized use of standardized “mood induction” procedures. Research has shown that experimental induction of mood can provoke a temporary state of feeling that is comparable with what naturally occurs (Westermann, Speis, Stahl, & Hesse, 1996). Reviewing the mood-induction literature reveals a range of possible methods for children, including emotionally eliciting books and music, imagery recall techniques, and using prizes or rewards to evoke moods (Brenner, 2000; Martin, 1990). However, each of these methods suffers from substantive weaknesses (Brenner, 2000). For
example, the most common method used with children involves self-generated imagery in which their recollection of and dwelling on a particular type of past experience are intended to elicit the desired mood. The most pervasive problems associated with this method are that not all children have had or can recall such experiences and younger children are especially unable to sustain attention during the task (Brenner, 2000; Martin, 1990; Westermann et al., 1996). Because of the limitations with past methods, we sought to develop an ecologically valid and broadly applicable mood-induction procedure. After extensive pilot testing, a mood-induction method based on false feedback about children’s performance on a novel video game was used in this research; false feedback has been used effectively to evoke positive mood in older research participants (Parrot & Sabini, 1990; Seeman & Schwarz, 1974; Ward, Friedlander, & Silverman, 1987). Children’s ratings of positive mood adjectives in a neutral versus positive mood state provided evidence for the validity of this new mood-induction procedure.

Measuring Risk Taking

Most research on risk decisions by children has used a computer-based gambling task that is modeled after the Iowa Gambling Task popular in adult research on decision making (Bechara, Damasio, Damasio, & Anderson, 1994). Although gambling tasks are relevant when assessing how costs and benefits impact children’s general decision making (Kerr & Zelazo, 2004; Miller & Byrne, 1997), these tasks are not relevant when the focus is on children’s behavioral decisions in situations that pose some threat of physical injury. Indeed, whereas a gambling task allows one to determine over trials how best to respond to maximize benefits and minimize losses, physical risk taking can result in an immediate and substantial loss (i.e., injury). Moreover, recent evidence indicates that performance on gambling tasks does not relate to health-risk behaviors in adolescents and adults (Overman et al., 2004). Similar findings have been found in studies comparing child-completed gambling-type tasks with their physical risk taking (Morrongiello, Lasenby-Lessard, & Corbett, 2009). Thus, a gambling task is not appropriate if the aim is to study decision making relevant to injury-risk situations. Rather, a measure of physical risk taking is needed.

Identifying ethically acceptable and valid ways to study children’s physical risk taking without placing them at risk of serious injury is challenging. In past research, a number of innovative approaches have been used, including observing children’s behavior in naturally hazardous situations (Ginsburg & Miller, 1982), having children set the height at which they will complete a novel balance beam task (Morrongiello & Matheis, 2007a), and creating contrived situations in which children indicate intentions to risk take when they are led to believe they will have to demonstrate the behaviors endorsed (Morrongiello & Matheis, 2007b; Morrongiello & Sedore, 2005). Building on these past approaches, the current study used two measures of risk taking, one that was an intentions-to-risk-take task that has been used before to explore how cognitive appraisals of injury risk predict risk taking (Morrongiello & Matheis, 2007a) and the other a measure of actual risk behavior that involved having children run an obstacle course that contained hazards that could result in minor injury.

Each child participated in both risk-taking tasks, completing an intentions-to-risk-take task that involved sorting photos of risk behaviors on playgrounds to indicate which they would do when a video of them was made, and running through an obstacle course (measures focused on injury-risk behaviors indicating recklessness, such as tripping up/down stairs, knocking into objects, falling into the wall or off a balance beam). The purpose of including two tasks was twofold. First, to determine whether mood differentially impacts children’s in vivo risk taking (obstacle course) versus their intentions to risk take (photo sort task). Although past research has shown that the risk behaviors children state they intend to do are the same behaviors they perform in the real world (Morrongiello, 2004), we reasoned that mood might have greater influence on risk taking when engaged in the actual behavior compared with imagining doing so (intentions task), which would evoke more cognitive appraisals of the situation. Second, and related to this, we reasoned that the trait of positive urgency might similarly show a stronger relation to actual risk taking than intentions to risk take because the intentions task imposes no time pressure and invokes cognitive activity (i.e., appraise and decide whether one will do what is shown).

Method

Study Design

Based on past findings (Morrongiello, McArthur, Kane, & Fleury, 2013), we anticipated obtaining medium to large effect sizes (i.e., greater than .20), and with α level set at .05 and power set at .80, this resulted in an estimated sample size between 26 and 60 depending on the statistical test to be applied (Cohen, 1992).

Participants

Children in regular classes between the ages of 7 and 10 years (M = 8.05 years, SD = 1.01 years) were recruited throughout the community (e.g., posters, ads, information...
letters). The final sample consisted of 68 children (47% male). Inclusion criteria included the following: Children were English speaking, normally developing (as reported by parent), and had never experienced an injury resulting in hospitalization. The sample included families with the following annual income brackets: $20,000–39,999 (2.9%), $40,000–59,999 (5.9%), 60,000–79,999 (13.2%), and above $80,000 (70.6%), with some preferring not to disclose (7.4%). Parent education included the following: high school diploma (7.9%), some or completed college (20.6%), some or completed university (42.2%), and some or completed advance degree (29.3%). Nearly all the participants were White (99%). All procedures were approved by a research ethics review board, and written parent consent and verbal child assent were obtained before testing.

**Materials**

Risk-Taking Tasks

Each child completed two tasks, one providing an index of actual risk behaviors (based on running through an obstacle course that contained hazards) and the other indexing intentions to risk take (based on endorsing which injury-risk behaviors he/she would do on a playground). Although every child completed both tasks, one task was designated his/her “test” task (i.e., completed twice but both times in a neutral state after completing filler tasks); there was random assignment of task to test condition across participants.

Actual Risk Taking: Obstacle Course. Similarly to past research (Morrongiello, Walpole, & Lasenby, 2007), an obstacle course was constructed in a 4.6 × 6-m room using agility cones, aerobic steps and risers, car tires laid flat, pylons, a wooden staircase, and a balance beam, with safety mats strategically located to prevent injury. Each child was video and audio recorded as he/she ran through the course. These videos were later coded to obtain measures of recklessness (i.e., tripping up stairs or over the aerobic steps, bumping into or knocking over pylons, hitting into walls at turn points, falling off the balance beam or off the aerobic steps, tripping or falling over the tires). Video coding reliability (25% of the videotapes) between two independent coders was 91% agreement; the data from the primary coder were analyzed. Higher scores indicate greater risk behaviors.

Intentions to Risk Take: Photo Sort Task. Each child was given a randomly ordered stack of 27 colored 8 × 10 photos, which were originally developed based on naturalistic observations of children actually playing on local playgrounds, with children’s judgments about risk then used to validate the photos (Morrongiello & Matheis, 2004). Children were asked to place each photo into one of two boxes (“Yes, I will do this,” or “No, I will not do this”) to indicate whether they would perform the behavior when a video was made later of them playing on the local playground; they were told to consider each behavior carefully because some children would be making a video later. Risk behaviors shown included standing while swinging, leaning over the top of a slide to look underneath, and not holding on when at the very top of a 4-foot climber. Higher “yes” scores indicate greater risk taking.

**Mood**

Mood Induction. To experimentally manipulate mood, each child played a computerized video game called the Piñata Task (Helfinstein et al., 2013). The game was developed to study the neural correlates of reward processing in children, but it suited our purposes perfectly because: no child was familiar with the game; children found it easy to understand, entertaining, and engaging; points accumulated based on playing so the concept of higher score was easily comprehended by children; and difficulty level could be modified on a trial-by-trial basis. During this game, the children are asked to swing at a number of piñatas that appear sequentially on the screen during trials, with the goal being to carefully time their swing (push of a keyboard button) so they are successful in hitting the piñata, which results in it breaking open and stars fall into a basket, thereby having points accumulate on each trial based on stars. The level of difficulty in playing the game was adjusted by the researcher on a trial-by-trial basis and was used to manipulate children's experience of success.

Each child played three trials of the game and was given extensive positive feedback about his/her improving performance. The first trial was set to be relatively easy to boost their confidence. To do better on the second trial, their reaction time had to become quicker, and most children did not do as well this round. By way of contrast, to make the third and final round most exciting, we encouraged them to try to do as well as they had the first time, and we simultaneously slowed down the required reaction time so that it was easier and they would earn their best score. Children were given extensive positive feedback over trials about their improving performance (e.g., “Wow you are getting so good at this. You are doing a fantastic job!”). By the last trial, every child (regardless of his/her actual performance) was made to believe that his/her score was the highest of any child before them—earning them a spot on a
fabricated “Wall of Fame” board. The fact that most children expressed delight in some way (e.g., smiled, laughed, clapped, bounced with excitement in their seat) on hearing this news, strongly suggests they believed the information provided.

Mood Ratings. To verify the effectiveness of the mood manipulation, every child was asked to complete ratings of his/her immediate mood three times during the session (see procedure). Using a visual analog scale (8-inch line) with one end designated as “Not at all” and the other as “Very much,” they were asked to put a line to indicate the extent to which they felt each of four positive adjective ratings (happy, energetic, excited, cheerful); based on where they place their line, each rating was then assigned a score between 0 and 8. Each of the mood state descriptors was taken from the Positive and Negative Affect Scale for Children (Laurent et al., 1999), which has been used to measure both state and trait affect (Merz & Roesch, 2011) and yields high internal reliability (Cronbach’s $\alpha = .83$). Scores were averaged for positive adjectives, with higher numbers indicating more positive mood.

Filler Tasks

To promote participants being in a relatively neutral mood state at various points during their visit, each child was asked to complete numerous easy worksheets; the sheets were described as “boring” but ones that we needed children’s help with to complete (e.g., write down as many things as possible for a number of different categories, including sports, vegetables, animals, fruits).

Questionnaires

Dispositional Risk Taking. To obtain a measure of dispositional risk taking, children completed the Risk Propensity Scale (Meertens & Lion, 2008). For each of eight items (e.g., I often take risks or do dangerous/scary things), children rated the extent to which the item was true of them ($1 = \text{not at all true}$, $5 = \text{almost always true}$). Scores ranged between 8 and 40, with higher scores indicating greater dispositional physical risk taking (Cronbach’s $\alpha = .77$).

Positive Urgency. The Positive Urgency Measure for Children that was developed for this study comprised 14 items that were modeled after those included in the Positive Urgency Measure for adolescents (Cyders et al., 2007). The items were modified by simplifying the language, and these were then pilot tested to ensure 7–10-year-old children’s understanding and interpretive accuracy. Internal reliability was high (Cronbach’s $\alpha = .86$). For each item (e.g., When I am in a really positive mood, I tend to lose control when I am in a great mood), children used a 7-point Likert scale to indicate their extent of agreement, with higher scores indicating greater positive urgency trait.

Procedure

After granting consent, the child completed a number of activities while the parent waited in another room. Each child was randomly assigned to one of two mood conditions (mood manipulation occurring immediately or delayed), as well as to receive one of the risk-taking tasks as his/her “test” task (i.e., completed in a positive as well as neutral mood state) and the other as the “control” task (i.e., completed twice in a neutral mood state); this arrangement and ordering of the mood-induction procedure ensured that any increase in risk taking on the test risk-taking task was not due to repeating the task twice but to being in a positive mood state. The flow chart in Figure 1 illustrates the sequence of events for the immediate and delayed mood condition orders. Questionnaires were presented in random order, with one completed before the child began the session and the other after completing the session.

To have every child begin each session in a neutral mood state, all children, regardless of mood condition (immediate or delayed), began the session by completing a filler worksheet during the first 7 min of the study, followed by a self-rating of their mood (i.e., baseline mood rating). The procedure then differed depending on mood condition (see Figure 1).

A child in the delayed mood-manipulation procedure would then be asked to successively complete both risk-taking tasks (obstacle course and picture sort) in their neutral mood state, with order of tasks randomized. Then they completed the mood-manipulation task and immediately provided another rating of their mood, followed by their test task, so that risk taking in a positive mood state could be measured and compared with that completed in a neutral mood state. After completing their test task in a positive mood, children completed a filler worksheet to return their mood to a relatively neutral state for the remainder of the visit; a third rating of mood was then completed. Children also completed the other risk-taking task for a second time, which served as their “control” task (i.e., both times the control task was completed in a neutral mood state).

Children in the immediate mood-manipulation procedure completed only one of the risk-taking tasks initially (obstacle course or picture sort), which acted as their “control” task before completing the mood manipulation. Immediately following this, they again provided mood
ratings and then completed their “test” task in a positive mood state. Children then completed another filler worksheet to reduce their mood to a neutral level; a third rating of mood was then completed. Following this, each child then completed both risk-taking tasks a second time, with order randomized. This procedure, as in the delay mood condition, resulted in each child providing risk-taking data twice for their test condition (i.e., in a neutral and positive mood state) and twice for their control condition (i.e., both in a neutral mood state).

When children ran the obstacle course, they were positioned at the start line (entrance of the room) and told to press a large button and then go through the course and press the button again; the button controlled a light that was used in video coding to designate the start/stop for each participant. Arrows on the floor designated the path to follow so all children took the exact same route through the course. When children completed the intentions-to-risk-take photo sort task, they were handed a random ordering of 27 photos and asked to sort these based on what they would and would not do when a video of them on a playground was made at a later time; children were told that it was entirely up to them to decide what to do and no one else but the researchers would know what they decided.

At the conclusion of the session each child was debriefed about the study and given a $5.00 gift card as a thank-you gift.

Figure 1. Flow chart showing the sequence of events for the immediate mood-induction procedure and the delayed mood-induction procedure to which participants were randomly assigned.
Analytic Approach

Several preliminary data-checking procedures were applied before analyses were conducted. Specifically, variables and change scores were examined for violations of normality, though none of the variables needed to be transformed. Similarly, we assessed for outliers based on standardized Cook’s distance, but none were identified. Before reporting within-participant analysis of variance (ANOVA), we assessed for violations of sphericity to determine whether adjustment to the degrees of freedom was warranted; no such adjustments were needed. Effect sizes are reported as partial $\eta^2$ because this has the advantage over $\eta^2$ that the magnitude is not affected by the number of effects in the ANOVA.

Results

Was the Mood-Induction Procedure Effective in Evoking a Positive Mood State?

Children gave ratings of positive mood adjectives three times throughout the session: The first was designated as “baseline” and was taken at the start of the session after the first filler task when in a neutral mood state, and the others were taken later in the session after the second filler task and after the mood-induction task. These ratings of positive adjectives were averaged, and a change score was computed to determine whether the mood-induction procedure increased positive mood score from baseline, in comparison with the change score in ratings taken after the second filler task. Data on ratings are given in Table I. A repeated-measures ANOVA with mood (2: positive, neutral) as a within-participant factor was applied to these change scores and revealed a significant effect of mood, $F(1, 67) = 18.07, p < .001$, partial $\eta^2 = .21$. The change in mood ratings from baseline was significantly higher following the mood-induction task compared with the second filler task ($M$ change $= 1.54$ and $0.19$, $SD = 1.30$ and $1.26$, respectively).

In addition, correlation analyses were conducted and revealed that risk-taking propensity did not relate to the extent of positive mood change shown after the mood-induction procedure, $p > .05$. The same result was obtained for positive urgency, $p > .05$. Thus, the mood-induction procedure worked as expected to significantly increase positive mood state, and effectiveness did not vary as a function of the individual difference attributes of risk-taking propensity and positive urgency.

Was There an Increase in Risk Taking When Children Were in a Positive Compared With a Neutral Mood State?

Intentions to risk take were measured by determining the number of risk behaviors endorsed in the photo sort task while in an induced positive mood compared with those endorsed while in a neutral mood state. Similarly, actual risk behaviors were measured by comparing the number of reckless behaviors made while running the obstacle course in an induced positive mood state compared with those when in a neutral mood state. These scores appear in Table II. Because risk intentions and behaviors were not measured on the same metric, to directly compare the change in risk-taking score between baseline (neutral mood state) and positive mood state (after mood induction), with that obtained from baseline to neutral mood state (postfiller task), the data shown in Table II were standardized before change scores were computed.

A repeated-measures ANOVA was applied to the change scores, with sex (2: male, female) as a between-participant factor and mood condition (2: neutral–positive change, neutral–neutral change) as a within-participant factor. A significant main effect of mood condition was observed, $F(1, 66) = 104.70, p < .001$, partial $\eta^2 = .61$. As can be seen in Table II, risk taking significantly increased when mood went from a neutral to a positive state, but it did not significantly change across neutral mood states. Moreover, examining how risk-taking propensity scores related to changes in risk taking revealed that children high in dispositional risk taking were especially reactive to being in a positive mood state: Risk-taking

### Table I. Descriptive Statistics for Visual Analog Scale Ratings Given for Positive Mood Adjectives (Possible Range: 0–8) at Baseline (Neutral Mood State) Compared With After the Mood-Induction Task (Positive Mood State) and After the Filler Task (Neutral Mood State), With Change Scores From Baseline Given in Brackets

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Baseline</th>
<th>After mood induction</th>
<th>After filler task</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>5.88</td>
<td>7.42</td>
<td>6.07</td>
</tr>
<tr>
<td>(SD)</td>
<td>(1.60)</td>
<td>(1.53)</td>
<td>(1.70)</td>
</tr>
</tbody>
</table>

*Designates a significant change at $p < .05$.

### Table II. Average (SD) Frequency of Risk Taking on the Intentions-Photo Sort Task (Range: 0–27) and Actual Behavior-Obstacle Course Task When in a Positive Mood State Compared With a Neutral Mood State

<table>
<thead>
<tr>
<th>Test task</th>
<th>Mood</th>
<th>Change score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intention</td>
<td>Neutral</td>
<td>Positive</td>
</tr>
<tr>
<td></td>
<td>13.93 (2.87)</td>
<td>16.96 (3.34)</td>
</tr>
<tr>
<td>Actual</td>
<td>3.68 (2.06)</td>
<td>6.33 (2.45)</td>
</tr>
</tbody>
</table>

*Higher scores indicate greater risk taking.

*Designates a significant change at $p < .01$.
propensity was highly positively correlated with increased risk taking when in a positive mood, $r(68) = .46, p < .01$.

**Did the Magnitude of Change in Risk Taking Vary With Type of Risk-Taking Task (Intentions or Behaviors)?**

To determine whether positive mood had differential effects depending on whether intentions to risk take or actual risk taking was examined, a one-way ANOVA with sex (2: male, female) and risk-taking test task (2: obstacle course, picture sort) as between-participant factors was applied to the standardized change scores. No main effect of condition was observed, $p > .05$. Thus, the magnitude of increase in standardized risk-taking scores from neutral to positive mood state was comparable for the intentions-to-risk-take ($M = 0.39, \quad SD = 0.54$) and actual-risk-taking ($M = 0.39, \quad SD = 0.59$) tasks.

**Did Positive Urgency Relate to Children’s Risk Taking and Did This Vary With Type of Risk-Taking Task (Intentions or Behaviors)?**

Children’s scores on positive urgency related to their risk taking when in a positive mood state, although the effect was stronger for actual risk taking than intentions to risk take; positive urgency scores did not correlate with risk taking on either task when in a neutral state. Specifically, a higher score on positive urgency was associated with more risk taking in a positive mood state when running the obstacle course [$r(68) = .27, \quad p < .01$], and there was a trend indicating a weaker effect for the intentions-to-risk-take task, $r(68) = .195, \quad p < .06$.

**Discussion**

Unintentional injury is a serious concern for children, leading to frequent emergency room visits, hospitalizations, permanent disabilities, and even death (Canadian Institute of Child Health, 2002; NCIPC, 2011; WHO, 2008). Elementary-school children are at particular risk of injury because it is often during this developmental period that parent supervision decreases and youth are making independent decisions about their own behaviors (Morrongiello, Kane, & Zdzieborski, 2011). Hence, there is a need for research that provides insights into factors that influence these risk decisions. Past research has focused primarily on temperament and cognitive-based determinants of children’s injury-risk behaviors. In contrast, the current study considered how emotion-based factors impact risk taking during childhood. Using a new and effective mood-induction procedure, and including both intentions and actual in vivo risk-taking tasks, the findings provide important insights into how positive mood state influences children’s risk taking and demonstrate that the trait of positive urgency is relevant during childhood and relates to this process.

Inducing a particular mood among children in a laboratory setting can be challenging, and most previously published procedures suffer from numerous limitations (Brenner, 2000; Martin, 1990). Hence, a new mood-induction procedure based on false feedback during a novel and engaging video game was used in this study. The results confirm the validity of the task and that it was effective in shifting children’s mood state from neutral to positive: Children reported themselves higher on positive mood descriptors immediately after the mood-induction procedure but not during other times throughout the session. The effectiveness of this new positive mood-induction task allowed us to determine that children engage in greater risk taking when in a positive mood state. Moreover, the magnitude of this effect was comparable for both the actual risk taking and intentions-to-risk-take tasks, which affirms past findings that risk-taking intentions are a good proxy for actual risk behaviors (Morrongiello, 2004). When the current findings are placed in the broader context of past research that demonstrates mood influences on risk taking in adolescents and adults (Cooper et al., 2000; Holub et al., 2005; Loewenstein et al., 2001), the confluence of evidence indicates that emotional determinants of risk behaviors operate across much of the lifespan, including early childhood.

Exactly how it is that being in an elevated positive mood leads to greater risk taking in children remains to be determined, and it might be that different mechanisms underlie this common outcome in children, adolescents, and adults. Based on past research, likely mechanisms implicate cognitive processing and/or optimism beliefs. Emotions not only influence what people attend to but also how they process information. For example, emotional arousal has been shown to result in attending narrowly to the immediate environment (Huntsinger, 2013), biasing attention toward particular stimuli (e.g., mood reinforcing) in the immediate situation (Tamir & Robinson, 2007), engaging in more superficial processing (Mackie & Worth, 1989), impairing logical thinking (Jung, Wranke, Hamburger & Knauff, 2014; Mackie & Worth, 1991), and neglecting threats and dangers (Baumeister, Bratskavsky, Finkenaer, & Vohs, 2001), all of which could lead to greater risk taking by limiting the capacity to recognize dangers or unsafe behaviors. Individuals in a positive mood state also are more optimistic about future outcomes (Deldin & Levin, 1986; Nygren, Isen, Taylor, &
Dublin, 1996); hence, they might recognize hazards and unsafe behaviors in the moment but be biased to appraise injury as a low probability outcome despite their processing of injury-risk indicators. Relevant to these points, children have been found to change their injury-risk appraisals in response to emotional arousal (e.g., evoking fear led to increases in rating of vulnerability for injury; Morrongiello & Matheis, 2007a) and to show an optimism bias in deciding how to behave in injury-risk situations (Morrongiello, 1997; Plumert & Schwebel, 1997; Schwebel & Plumert, 1999). Thus, past research suggests that both of these explanatory mechanisms linking emotions and risk taking in childhood are plausible. Nonetheless, further research is needed to evaluate directly whether these mechanisms explain the relation between mood and risk behaviors obtained herein, and to determine whether mechanisms vary with developmental level. Suffice it to say, the current findings contribute by providing the first evidence that being in a heightened positive mood state is associated with greater engagement in injury-risk behaviors during childhood.

The current study also extends our understanding of two individual difference traits that influence risk taking during childhood. First, children who scored high in dispositional risk taking were shown to be especially reactive to being in a positive mood state: Risk-taking propensity was highly positively correlated with increased risk taking when in a positive mood. These children also have been shown to be especially reactive to showing risk compensation, that is, responding to wearing safety gear (e.g., helmet) by actually increasing risk taking (Lasenby-Lessard & Morrongiello, 2011; but see Hedlund, 2000 for discussion about debates regarding risk compensation). Similarly, these children show elevated risk taking for both low- and high-experience activities, whereas for most children, extent of risk taking varies directly with level of experience with the activity (Lasenby-Lessard & Morrongiello, 2011). Considered together, these findings suggest that these children form a unique high-risk group because they not only routinely engage in high levels of risk taking but are also easily provoked to engage in greater risk taking, whether because of positive mood or indicators suggesting that injury risk is reduced (e.g., wearing safety gear).

The second trait that emerged as important for understanding children’s risk taking was positive urgency. To the best of our knowledge, this is the first study to demonstrate this trait in children and that it operates similarly as for adolescents and adults. Specifically, scoring higher in positive urgency was associated with increased risk taking when in a positive mood state. Importantly, scoring high on positive urgency did not change how a child reacted to the mood-induction procedure per se; hence, his/her mood ratings were comparable with those of children who scored lower on positive urgency. This is consistent with research with teens that has noted that positive urgency does not lead individuals to experience emotions more often or more intensely (Cyders et al., 2010). Rather, the trait is specific to predisposing individuals to rash behaviors when in a heightened positive mood state, rather than impacting their experience of emotions per se. One difference that did occur with test task was that positive urgency had a greater effect on actual risk taking than intentions to risk take. This may reflect the fact that the photo sort task invoked fewer automatic risk reactions than did running the obstacle course because it took time to view and judge the behavior shown in the photo and then decide whether to do it. Thus, the impact of positive urgency may have been dampened somewhat in the intentions-to-risk-taking task because this task invoked cognitive appraisal activity and there was less opportunity, therefore, for instantaneous responding.

**Limitations and Future Research**

Despite the significance of the findings from this research, there are some limitations that should be recognized and addressed in future research. First, because the majority of the sample was Caucasian and earned a reasonably high income, this may limit generalizability of the findings. Recruiting a more ethnically and economically diverse sample would be important to assess for this possibility in future research. Second, although the new mood-induction procedure was effective for manipulating mood state, there is no way to know how the level of positive mood experienced in the lab compares with what children typically experience during the course of their day-to-day lives, and whether variation in the level of positive mood experienced has important implications for risk taking. Would the effects observed be greater and even more robust, for example, if children had experienced a higher level of positive mood state? More systematic examination of how variation in positive mood influences the nature and extent of risk behaviors would further advance our understanding of links between mood and injury-risk behaviors during childhood. Related to this, conducting observational research is important to determine whether the effects of positive mood and urgency occur in naturalistic settings. Finally, research exploring the implications of these effects is warranted. For example, the presence of peers leads children to engage in greater risk taking (Christensen & Morrongiello, 1997; Ganzel, 1999; Gardner & Steinberg, 2005; Morrongiello & Sedore, 2005). Although little is
known about how this effect is realized, it may be that positive mood is enhanced when with peers and this explains that finding. If so, then a phenomenon known as “mood contagion” (i.e., positive emotion may be unconsciously spread throughout a group of individuals; Neumann & Strack, 2000) may be relevant and would be important to consider in future research on mood and children’s risk taking.

Conclusions

Using a novel mood-induction procedure developed for this research, the current findings provide the first evidence that being in a heightened positive mood state leads to increased risk taking and intentions to risk take during middle childhood. Moreover, this research demonstrates that positive urgency is a trait that can be reliably measured and is relevant to risk taking during childhood. Specifically, those scoring high in positive urgency were particularly inclined to respond with increased risk taking when in an aroused state. Thus, being in a heightened positive mood state can lead children to engage in riskier play behaviors than they would otherwise, and those high in positive urgency trait are especially likely to show this mood effect on risk taking.

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