Exploring the Differential Influence of Positive Mood on School-Aged Children’s Risk Taking

by

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ABSTRACT

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Children’s intentions to engage in risk taking and actual risk behaviours were compared while in a neutral and positive mood state. Positive mood was reliably and significantly induced experimentally via false positive feedback during the playing of a novel videogame. Within-person mood comparisons demonstrated that children engaged in more risk taking when in a positive mood compared to a neutral mood. This increase was observed in both measures of intent to risk take, as well as in actual behaviour. Positive urgency did not predict risk taking while in a positive mood. These findings reveal, for the first time, that positive mood is associated with greater risk taking in young children. Implications for injury prevention are discussed.

Keywords: risk taking, positive mood, mood induction, positive urgency
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An Overview of Unintentional Childhood Injury

In industrialized nations unintentional injuries are the leading cause of death, disability and hospitalization for individuals above the age of one year (Canadian Institute of Child Health, CICH, 2000; National Centre for Injury Prevention and Control, NCIPC, 2011; World Health Organizations, WHO, 2008). Regrettably, Canadian children between one and fourteen years are no less immune to what some have labelled an ‘invisible epidemic’ with 9.7 deaths for every 100,000 children (UNICEF, 2001). In Canada, unintentional injuries are directly responsible for over 211,000 hospitalizations, 3 million emergency room visits, at least 10 billion dollars in health care costs, in addition to over 13,000 deaths annually (SMARTRISK, 2009). Consequently, injuries pose a serious and significant threat to children in Canada.

Efforts to prevent injuries must begin with not only a greater understanding of the impact, but of the factors that place a child at risk for injury. For example, we know that the nature and location of injury varies significantly with the developmental level of a child. Infants and pre-school children are very likely to experience an injury in and around the home, most commonly through poisoning or falls (Shannon, Brashaw, Lewis, & Feldman, 1992). Thus, injury prevention programs aimed at infants and toddlers target the home safety practices of caregivers. For school-aged children, injuries occur at a much high frequency when they are unsupervised and playing away from the home, with falls off playground equipment being particularly common among this cohort (Morrongiello, 1997; Scheidt et al., 1995; Shannon et al., 1992). While alone on a playground, in a backyard, riding a bike, or crossing the street, these children are often left to make independent decisions about their own injury risk. With increasing age,
children are less likely to be supervised during play and consequently, have a much more direct influence on the probability of their being injured. This realization, coupled with strong evidence that suggests that the majority of injuries to children can be prevented (Philippakis et al., 2004; Rimsza, Schackner, Bowen, & Marshall, 2002; Safe Kids Canada, 2010), has led injury researchers to focus on identifying the factors that influence children’s risk taking so that we can better understand their differential susceptibility to injury. The current study addressed this issue.

Factors That Influence Risk Taking

A number of individual attributes and personality traits have been related to risk taking during childhood. Both a child’s age and gender, for example, have consistently differentiated tendencies to engage in risk taking behaviours (Baker, O’Neil, Ginsberg, & Li, 1992; Grossman, 2000; Scheidt et al., 1995). Below is a review of some of these factors that are relevant to the current research.

**Gender.** There is substantial evidence of differences in risk taking behaviour between males and females. These gender differences have been documented as early as age 3 (Rivara, Calonge, & Thompson, 1989), with boys consistently engaging in more risk taking and being more likely to incur unintentional injuries than girls (Coppens & Gentry, 1991; Morrongiello & Rennie, 1998; Scheidt, Harel, Trumble, Jones, Overpeck, & Bijur, 1995). Interestingly, even when engaged in the same activity, boys are more likely than girls to execute the activity in a more hazardous way (Rivara, Bergman, LoGerfo, & Weiss, 1982). For example, a study by Morrongiello and Dawber (1998) found that among 2 and 3 year old children, both boys and girls were equally likely to approach potential hazards. However, boys were far more likely to immediately interact with the hazard, whereas girls often paused or pointed out hazards to nearby caregivers. Further, while boys and girls may differ in their responses to the same activity or
hazards, there is also evidence that parent responses differ depending on the sex of the child. Specifically, in a study by Morrongiello and Dawber (2000), mothers were more encouraging of their son’s risk taking and much slower to intervene once risk elevated to more serious levels, while they were more likely to caution their daughters about their vulnerability to injury. Thus, gender not only serves as a strong predictor for childhood risk taking, but also influences how caregivers react to their child’s risky behaviours.

**Age.** Middle childhood is a period of particularly heightened risk for injury. Sheehy and Chapman (1985) found that among children of all ages, 8 to 11 year olds were less likely to identify situations as being hazardous, as well as perceive hazardous situations as less threatening than both older and younger children. Further, school-aged children are injured more frequently, and disproportionately represent a category known as “accident-repeaters” (i.e., children who incur multiple injuries over time; Boyce & Sobolewski, 1989).

Middle childhood also appears to present a time of considerable confusion to parents about what constitutes appropriate and adequate levels of supervision. Peterson, Ewigman, & Kivlahan (1993) found that many parents of 9 and 10 year old children indicated it would be appropriate for children to play in a neighborhood unsupervised for several hours. However, parents of children younger than 9 were more likely to indicate that children cannot be left unsupervised for more than a few minutes, if at all. There is little evidence to support that this drastic shift in supervision levels is warranted based on biological or cognitive development. Further, as supervision is reduced during middle childhood, it is often met or accompanied with an increase in peer socialization and interaction.

**Peers.** Wilson, Baker, Teret, Shock, & Garbarino (1991) argue that one of the greatest risk factors for injury to school-aged children is the influence and presence of peers. School-aged
children’s risk decisions can be influenced by both the verbal appeals and nonverbal communications (i.e., facial displays) from their peers. Further, the quality of the relationship actually mediates the impact of these risk-endorsing communications, such that a valued relationship (e.g., a best friend) is more likely to influence a child’s decision to engage in risk taking (Christensen & Morrongiello, 1997; Morrongiello & Rennie, 1998). Gender may also play a role in whether or not children experience peer influences for risk taking. Lewis and Lewis (1984) discovered that males are much more likely to encounter pressure from peers to perform risky behaviours in situations that put them at risk for physical injury. Thus, as parent supervision decreases in middle childhood, peer influences are likely playing a particularly heightened and critical role in a child’s decision to engage in risk behaviour, particularly among boys.

**The Influence of Mood**

Mood states are known to influence the risk decisions of adults and adolescents. Positive mood has been linked to an increase in risk behaviours such as alcohol consumption, drug use, gambling, and unsafe sexual practices (Cooper, Agocha, & Sheldon, 2000; Holub, Hodgins, & Peden, 2005). Moreover, positive mood states are known to increase risky behaviour in adolescence regardless of individual attributes that may have served to protect them (Loewenstein, 1996; Loewenstein, Weber, Hsee, & Welch, 2001). By extension, emotions may place an adolescent at risk for injury even in the presence of protective traits. Virtually no studies directly relating mood to risk taking among children have been conducted, despite evidence that suggests positive mood may play an important role in this regard. The current research addresses this gap in the literature.

Historically, research on risk taking has ignored the influence of mood, favouring a
cognitive or rational-based decision making approach (Funucane, Alhakami, Slovic, & Johnson, 2000; Shavir, Simonson, & Tversky, 1993). However, more recent research has contributed increasing evidence that emotions can actually undermine rational decision making, producing rash judgements that are more likely to lead to injury (Lerner & Tiedens, 2006; Loewenstein, 1996; Loewenstein, Weber, Hsee, & Welch, 2001). Research with adults has demonstrated that not only do emotions influence decision making but that emotionally influenced decisions are actually more impulsive. What follows is a review of how the various components of emotion affect our risky decision making processes and how this might lead to higher injury rates.

Lewinsohn and Mano (1993) proposed a model positing that emotions, affect, and mood\(^1\) are based on two separate but related dimensions, valence (evaluation as positive or negative) and arousal (level of physiological arousal, varying from calm to excited). Brainerd and Reyna (1996) adopted this model for their theory of decision making and reasoning. They propose that individuals form mental representations for past events which contribute to their future decision making. These representations are described as either verbatim memoires, conceptualized as detailed accounts of the past event, or gist traces, defined as less clear and more generalized representations of an event. Valence (the evaluation of something as being positive or negative) is considered the most fundamental of gist representations, used as a quick and basic evaluation of a stimulus as being positive or negative, or rather, risky or not (Adolphs, Tranel, & Buchanna, 2005; Rivers, Reyna, & Mills, 2008).

Based on this model, immediate judgements may be made about a situation or stimulus by an individual who categorizes it as positive or negative (valence) and this in turn, activates, or not, certain physiological effects (arousal). Thus, behavioral decisions are based on fairly snap

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\(^1\) Although dispute exists among researchers (Beedie, Terry, & Lane, 2005; Grable & Roszkowski, 2008), the terms emotion, affect, and mood are often used interchangeably in the literature and research.
judgements that are potentially easily influenced by emotion. To validate this line of thinking, Rivers, Reyna and Mills (2008) examined decision making and discovered that when an individual was in a positive mood their decisions were made more quickly, more simplistically, and relied more often on stereotypes and heuristics than when in a neutral mood state. Further, Deldin and Levin (1996) demonstrated that individuals who are making decisions while in a positive mood actually view the probability of gains more optimistically than those in a neutral mood. That is, their expectation of a positive outcome increases substantially when in a positive mood state. Mackie and Worth (1991) proposed that positive moods actually impair systematic thinking that then leads to poor judgement making and superficial thinking and may erroneously signal that the environment is benign or safe. This line of thinking could be detrimental to one’s safety as it decreases the likelihood that an individual would carefully scrutinize a situation and notice any associated risks. This theoretical perspective lends support for the possibility that rational decision making can be undermined by emotions relatively easily, particularly when quick decision making is required. The potential for positive emotion to negatively influence decisions among youth making judgements relevant to injury risk is highly likely, but to date no direct evidence on this has been obtained.

One link between mood and risk taking that has been considered has to do with risk taking in the anticipation of experiencing a positive mood state. Zuckerman (1994) argues that motivation for or anticipation of a feeling is a key predictor of risk taking, especially for those high on the sensation seeking trait. Similarly, adolescents’ predicted emotional responses have been shown to contribute to the decisions they make around risk behaviours like smoking, drug use, or drinking (Barnea, Teichman, & Rahar, 1992). Less is known about how anticipated moods relate to children’s risk taking, however, Morrongiello and Matheis (2004) demonstrated
that anticipated feelings of excitement predicted their decisions to engage in risk taking behaviour. Research also suggests that children’s appraisals of risk can change depending on the facial expressions of an unknown child engaging in risky behaviour. A child’s readiness to imitate risk behaviours increases when they observe a child whose face is that of a happy or positive mood (Morrongiello & Rennie, 1998). Evidently individuals, including children, are more inclined to take risks when they believe a positive mood will ensue.

Nonetheless, we don’t know how mood state affects children’s risk taking decisions in the immediate moment the emotion or mood is being experienced. Emotions create action and behaviour in humans; most commonly fear produces escape behaviour. Fredrickson (2001) proposed that although positive emotions may not produce specific actions, they may broaden an individual’s awareness to the situation and encourage novel and varied thoughts and actions. It is perhaps through this *broaden-and-build theory* that positive emotions may facilitate an individual’s willingness to engage in behaviours that are unknown and ultimately risky. We know that positive emotions are a predecessor of many types of risky behaviours for adolescents and adults, but the impact on children is unclear. It is apparent that positive mood influences children’s risk taking decisions when their behaviour is an antecedent for mood (i.e. “if I do this it will be fun and I will feel good”). Less evident though, and the aim of this research is how immediate positive mood states affect school-aged children’s in-vivo decisions about risky behaviours, and whether being in a heightened positive mood leads them to endorse and actually engage in risk behaviours they had not originally planned for. Research with teens and adults confirms that being in a positive mood state often leads to risky behaviours, however, it is not known whether similar processes operate during childhood.
Positive Urgency

Well established is the idea that positive mood states generally elevate adults and adolescents likelihood for engaging in unsafe behaviours. However, Cyders & Smith (2007) argue that this effect may not be uniform and that some individuals may be more inclined to risk take when in a positive mood state than others. Specifically, they proposed a personality trait termed ‘positive urgency’ (i.e., the tendency to act rashly and impulsively in response to positive mood states) would predict who is most likely to risk take when in a positive mood. Several studies with adults and adolescents have confirmed that positive urgency is a meaningful trait for understanding behavioral tendencies in risk situations (see Cyders et al., 2010). Determining whether this trait has the ability to significantly differentiate between young children who may be more likely to risk take in reaction to a positive mood would provide a better understanding of who is ‘at risk’ and allow for more directed intervention strategies. Thus, exploring the potential effects of this trait within children is a critical step to understanding school-aged children’s risk taking and was addressed in this research.

Current Research

The current study examined the impact of positive mood state on school-aged children’s injury risk behaviours. Moreover, by examining whether the individual attribute of positive urgency interacts with an experimentally induced positive mood state, we sought to determine if some children are more susceptible than others to the impact of positive mood on risk taking.

The difficulty in researching naturally occurring events that evoke positive mood has prompted the popularized use of standardized mood induction procedures. Experimental induction of emotion can provoke a temporary state of feeling that is comparable to naturally occurring emotions (Westermann, Speis, Stahl, & Hesse, 1996). A wide variety of techniques
have been utilized in the past, including emotionally eliciting books and music, imagery recall, and prizes or rewards. However in 1990, Martin cautioned researchers that most of these techniques are not uniformly effective because participants will often have differing experience or exposure to the materials or procedures. Therefore, the current research sought to develop a novel and more ecologically valid procedure based on false-feedback in which children were given encouraging feedback on their performance while playing an engaging and novel videogame. Feedback indicating a successful performance has been used effectively in the past to produce positive feelings in older research participants (Parrot & Sabini, 1990; Seeman & Schwarz, 1974; Ward, Friedlander, & Silverman, 1987).

In the present study each child participated in two risk taking tasks, running through an obstacle course (measures focused on behaviours indicating recklessness, such as tripping and knocking things over) and completing an intentions to risk take task that involved sorting pictures of risk behaviours on playgrounds to indicate which they would do if a video of them was to be made. The purpose of including two tasks was to determine if mood differentially impacts children’s in-vivo risk taking (obstacle course) versus their intentions to risk take (picture sort task). Past research has shown that the risk behaviours children state they intend to do, are the same behaviours they perform in the real world (Morrongiello, 2004). However, whether mood would influence both risk taking measures similarly is not known and was addressed herein.

Hypotheses

The current study tested the following hypotheses:

**H1**: False positive feedback given while playing a novel videogame will successfully produce an experimentally induced positive mood.
**H2**: Children will respond to being in an experimentally induced positive mood state by engaging in great risk taking (behaviours and intentions).

**H3**: There may or may not be difference in the extent of change as a function of test condition (obstacle course or picture sort); no formal hypotheses were applied.

**H4**: Children higher on positive urgency will show a greater reaction to being in a positive mood state evidenced by greater increases in risk taking on both tasks, when compared to children not showing this temperamental attribute.

**Method**

**Participants**

Participants included 68 parents and their typically developing children who were between the ages of 7 and 10 ($M = 8.05$ years, $SD = 1.01$ years). Participants were recruited from Guelph, Ontario and the surrounding area via telephone using the family database stored at the Child Development Research Unit (CDRU) at the University of Guelph. Of the 68 children, 30 were male (44%) and 38 were female.

The overall sample included families with the following annual income brackets: below $20,000 (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: 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 Caucasian (99%) and married (93%).

**Materials**

**Risk Taking Tasks.** Each child completed multiple tasks, two of which were specifically utilized to assess risk taking, either actual behaviour (running through an obstacle course) or
intentions to do so (endorsing which risky play behaviors they would do on a playground). Although every child completed both of the risk taking tasks, one task was randomly selected to occur directly after a mood manipulation – identified as their ‘test’ task, and as such was hypothesized to change via the influence of the mood manipulation.

**Obstacle Course.** Previous intervention research successfully used an obstacle course to capture increases in risk taking behaviours using a pre/post design with seven to twelve year old children (Morrongiello, Walpole, & Lasenby, 2007). Therefore, a similar obstacle course was constructed in a 14 x 15 room, using agility cones, aerobic steps and risers, tires, gym mats, a balance beam, and poles with bells attached (see Appendix A for photograph). Each child was video and audio recorded as they ran through the course. These videos were later coded to obtain measures of recklessness (e.g., tripping, bumping into objects or walls, falling). Video coding reliability (25% of the videotapes) between two independent coders was 90% agreement; the data of the primary coder was analyzed.

**Picture Sort.** Each child was asked to look at pictures of same-sex peers performing various behaviours on a playground. Some of the behaviours were risky (e.g., standing on a climber without hands), while others were considered relatively benign (e.g., skipping); these photos were originally developed based on naturalistic observations of children actually playing on local playgrounds, with children’s judgments used to validate the photos designated as ‘risky’ (Morrongiello & Matheis, 2004). Children were asked to place each photo individually into one of two boxes (“yes, I would do this”, or “no, I would not do this”) to indicate whether they would perform the behaviour seen in the picture if a video of them playing on a playground were to be made.

**Questionnaires.** Each child was asked to complete a Positive Urgency questionnaire that
was developed for this study (Cronbach’s alpha = .86), with items modeled after the measure used with adolescents (Cyders et al., 2007). This measure included 14 items with a rating scale of 1 through 7. The scale required each child to reflect on their reactions to and outcomes of being in a positive mood by asking questions such as “when I am in a great mood, I tend to get into situations that cause me problems” or “I tend to lose control when I am in a great mood.” Higher scores indicated greater Positive Urgency.

Parents were asked to complete a demographic information sheet that provided information on their education, income and ethnicity.

**Mood Induction.** In an effort to experimentally manipulate mood, each child played a computerized video game called the Piñata Task; this was developed by Nathan Fox and colleagues to study other aspects of personality and they allowed us to modify the game for our purposes. Children played three trials of the game on a computer and were given extensive positive feedback over trials about their improving performance (e.g., “wow you are fantastic at this, have you played this before!?”). By the last trial, every child (regardless of their actual performance) was made to believe that their 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.** Every child was asked to complete intermittent ratings of their immediate mood. Using a sliding scale, they were asked to indicate how much they felt a particular way (e.g., happy, energetic). Each of the mood state descriptors was taken from the Positive and Negative Affect Scale for Children (PANAS-C; Laurent, Catanzaro, Rudolph, Lambert, Osborne, et al., 1999), which has been used to measure both state and trait affect (Merz &
Roesch, 2011). A total score for positive adjectives was determined, 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 separate worksheets, posed as boring or tedious tasks that needed to be done. Children were asked to think of and write down as many things as possible for a number of different categories (e.g., sports, vegetables, animals, fruits).

**Procedure**

After obtaining clearance from the University of Guelph Research Ethics Board, researchers telephoned parents from a database of families who consented to be contacted for research purposes at the time of their child’s birth. If interested in participating, parents were asked to come with their child to the Child Development Research unit on the University of Guelph campus. Upon arrival each parent and child dyad were asked to separately review, discuss and sign consent forms (See Appendix B and C respectively) indicating their approval of the study process. Parents were then asked to spend the remainder of their time completing questionnaires for an unrelated study on a laptop computer, while their child completed a number of activities with the researchers.

In an effort to eliminate ordering effects two procedures were used so that each participant was randomly assigned to one of two conditions – mood manipulation occurring immediately or mood manipulation that was delayed.

All children, regardless of condition (immediate or delayed) were given a worksheet to complete during the first 7 minutes of the study. The purpose of this task was to have every child begin each session in a comparable mood state (feeling relatively calm and neutral) which was also verified by mood ratings – see above. 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 (in random order). Following this, they completed the mood manipulation task (piñata video game) and immediately provided another rating of their mood. Participants then completed one of the risk taking tasks again - their designated ‘test task’ (obstacle course or picture sort). Each child’s ‘test task’ was randomly selected prior to the start of every visit.

After completing one of the two risk taking tasks in an experimentally induced positive mood, children were then asked to independently complete a second worksheet in an effort to return their mood to a relatively neutral state for the remainder of the visit (this was also verified by a third rating of mood). Children then completed the other risk taking task for a second time, acting as their ‘control task’. They then concluded the visit by completing the Positive Urgency questionnaire; this questionnaire was completed after all tasks to reduce the likelihood that the items on the questionnaire might lead children to be alerted to the true purposes of the study. This procedure allowed for a direct comparison of the risk taking tasks in both a neutral and positive mood state and the verification that positive mood increases risk taking in one task, but not the other. However, to ensure that risk decisions or behaviours did not increase simply because the child was more comfortable performing the task a second time, an additional procedure (immediate mood manipulation) was used on half of the participants.

Much like in the delayed procedure, in the immediate mood manipulation procedure children began each visit by completing the worksheet and initial ratings of mood. They then completed only one of the risk taking tasks (obstacle course or picture sort) which acted as their ‘control task’ before completing the mood manipulation (piñata game). Immediately following mood manipulation they again provided mood ratings and successively completed their
randomly designated ‘test task’. Following this, each child was also asked to independently complete a worksheet in an effort to reduce their mood to a neutral level (verified by ratings). Each child then completed both risk taking tasks a second time and similarly concluded the visit by completing the positive urgency questionnaire. The addition of this procedure allowed for the confirmation that the mood manipulation was more likely the only reason for risk taking (either behaviour or decisions) to increase, as increased risk should occur even when it is the first time the child is completing the task.

Following each procedure, each child was debriefed (see Appendix D).

Results

Was the mood induction procedure successful in elevating mood?

Ratings of positive adjectives were averaged and a difference score was computed to determine whether the mood induction procedure increased mood scores from baseline (e.g., averaged positive mood rating in aroused mood minus averaged positive mood rating at baseline or when in a neutral mood), and whether neutral mood states were equivalent (e.g., averaged positive mood rating while in neutral mood following second filler task minus averaged positive rating at baseline). The difference scores were than analyzed using a repeated-measures Analysis of Variance (ANOVA) with sex (2: male, female) as a between-participants factor and mood (2: aroused change, neutral change) as a within-participant factor. There was a significant main effect of mood, $F(1,66) = 22.86, p < .001$, partial eta squared = .26. As shown in Table 1, ratings showed a significantly greater increase from neutral to positive mood state ($M$ change = 1.54, $SD = 1.30$) than from neutral to neutral mood state ($M$ change = .99, $SD = 1.26$). No significant effect of gender was observed, $F(1,66) = .57, p = .46$, partial eta squared = .01. However, there was a significant gender x mood interaction, $F(1,66) = 8.26, p < .01$, partial eta squared = .11. To
investigate the nature of this interaction further, follow up one-way ANOVA’s were conducted.

Change in ratings from a neutral to positive mood state given by males ($M_{\text{change}} = 1.62,$ $SD = 1.06$) and females ($M_{\text{change}} = 1.47, SD = 1.30$) did not differ, $F(1,66) = .20, p = .66,$ partial eta squared = .00. Similarly, the magnitude of change in ratings from a neutral to neutral mood state for males ($M_{\text{change}} = 0.67, SD = 1.10$) and females ($M_{\text{change}} = 1.24, SD = 1.33$) also did not differ, $F(1,66) = 3.57, p = .06,$ partial eta squared = .05. However, for females, change in mood state from neutral to positive mood did not differ significantly from the change in mood state across neutral conditions ($M_{\text{change}} = 1.47$ and $1.24, SD = 1.30$ and $1.33,$ respectively), $F(1,37) = 2.84, p = 1.00,$ partial eta squared = .07, whereas the change in ratings given by males was significantly greater for the neutral to positive condition than for the neutral to neutral condition ($M_{\text{change}} = 1.62$ and $0.67, SD = 1.06$ and $1.10,$ respectively), $F(1, 29) = 19.42, p < .001,$ partial eta squared=.07. Thus, the mood induction procedure worked similarly for males and females but the effects seemed to persist longer for females, resulting in elevated ratings on the neutral change condition, whereas boys’ mood state returned to baseline more quickly.

**Was there an increase in risk taking when children were in a positive mood state?**

Intentions to risk take were measured by determining the number of risk behaviours endorsed through the photo sort task while in an induced positive mood and comparing to those endorsed while in a neutral mood state. Risk taking behaviours were measured by comparing the number of reckless behaviors made while running through an obstacle course in a positive mood and comparing them to the behaviours observed while running through in a neutral mood state. This allows for a direct comparison of overall risk taking change (both intentions and behaviours) while in a positive state compared to a neutral state. However because intentions and
behaviours were not measured on a similar metric, standardized change scores were used. A repeated-measures ANOVA was applied to the data with sex (2: male, female) as a between-participant factor and mood condition (2: positive change, 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 squared $= .61$. As shown in Table 2 risk taking significantly increased when mood went from a neutral to aroused state ($M = .39, SD = .56$), whereas risk taking while in similarly neutral states did not increase ($M = -.39, SD = .43$). There was no significant effect of gender, $F(1,66) = .81, p = .37$, partial eta squared $= .01$, nor was there an interaction between sex x mood condition, $F(1,66) = .32, p = .57$, partial eta squared $= .01$. Thus, as anticipated, risk taking increased when children were in a positive mood state suggesting that mood state influences children’s risk taking.

**Did the magnitude of change in risk taking vary with type of risk taking task (intentions or behaviours)?**

To determine if 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 ‘test’ condition (2: obstacle course; picture sort) as between-participant factors was analyzed. No main effect of condition was observed, $F(1,66) = .01, p = .92$, partial eta squared $= .00$, indicating that the increases in risk taking did not vary with type of task – this increase in risk taking was comparable for the intentions to risk take ($M = .39, SD = .54$) and actual risk taking ($M = .39, SD = .59$) task (see Table 3). There was no main effect of gender, $F(1,66) = .78, p = .38$, partial eta squared $= .01$, nor a gender x condition interaction, $F(1,66) = .07, p = .79$, partial eta squared $= .00$. 
Did children who scored high on positive urgency show greater increases in mood shift or greater risk taking?

Using simple linear regression, a model was created to determine if one could predict the magnitude of change from neutral to positive mood state from positive urgency scores. Results did not reveal any significant effect, $F(1,66) = 3.32, p = .07, R^2 = .05$. Similarly, positive urgency did not predict greater risk taking, $F(1,66) = .27, p = .61, R^2 = .00$. Thus, scoring higher on positive urgency did not influence how children responded to the mood induction procedure, nor did it predict greater risk taking.

**Discussion**

Unintentional injury is a serious concern among young children, leading to frequent emergency room visits, hospitalizations, permanent disabilities, and even death (Baker et al., 1992; Canadian Institute of Child Health [CICH], 2002; Rodriguez, 1990). School-aged children are at a particularly heightened risk for injury because it is often at this point developmentally that parent supervision decreases, and they are making independent decisions about their own safety. The purpose of this study was to examine whether children’s risk taking would vary as a result of their current mood state. To address this issue, this study introduced a new and effective mood induction procedure which involved the delivery of intense positive feedback while each child played a novel computerized videogame. The present study was unique in that it allowed for a direct comparison between intentions and actual in-vivo risk taking behaviour. The results are consistent with past findings (Morrongiello, 2004) that measures of intent are equivalent to measures of actual behaviour when the focus is on risk taking among children. The findings also for the first time, offer insight into the relationship between current mood state and risk taking during childhood.
Results confirmed that the mood induction task was effective in increasing each child’s current mood state from neutral to positive. Children rated and reported themselves higher on mood descriptors such as happy, cheerful, and excited immediately after the mood induction procedure than during neutral moments. This finding confirmed the effectiveness of this new positive mood induction task, and allowed us to determine if children showed increased risk taking when in a positive mood state. Interestingly, while mood ratings taken at baseline and immediately after mood induction did not differ between genders, ratings within each gender did. After the second filler task positive mood did not decrease to the same extent for females as it did their male counterparts. These results provide evidence that the mood induction procedure may have had a differential effect for females than males, with positive mood lasting longer for females. However, in a review by Clark (1983) which examined the effectiveness of multiple mood induction procedures, gender differences were not a common finding. Since gender differences are not consistently observed in mood induction research, it is possible that the current findings may be a reflection or product of the procedure used here. Success with the current procedure was dependent on positive feedback being acknowledged, accepted, and believed, and it is possible that females were more influenced than males by the feedback they received while playing the video-game. In fact, a study by Roberts & Nolen-Hoeksema (1994) provides evidence for this notion in their examination of how male and female adolescents responded to positive feedback. They found that female’s evaluations about their own performance became increasingly positive when they received external feedback that was positive, whereas male’s self-evaluations were far less influenced by feedback. If female’s evaluations of themselves are more easily altered by the appraisals of others, it is not surprising that this procedure may have been more effective in producing more prominent or longer lasting
results for girls. However, given that gender differences are uncommon and research that may help to explain these results was completed with adolescents and not children, it is also possible that the current results may be artificial. Nonetheless, future research utilizing feedback as a method for inducing positive mood should at least consider the implications of differential gender effects.

Unlike mood, risk taking (decisions and behaviours) while in a positive mood state did not differ based on gender. Thus, although female’s moods did not decrease to the same extent as males following the positive mood induction, their decisions to and actual engagement in risky behaviour remained heightened when in a positive mood. The fact that children, regardless of gender, make more risky decisions and performed riskier behaviours while in a positive mood state may help to explain why they experience more injuries when they are among peers and without adult supervision (Shannon et al., 1992).

Further, increased risk taking was observed both in the intention to risk take and actual risk taking task. Because in-vivo measures of risk taking are often more difficult to obtain, this research further supports that children’s measured intentions are an accurate reflection and are closely aligned with their future behaviours (Morrongiello, 2004). This also suggests that positive mood does not just simply produce more impulsive behaviour, but perhaps undermines children’s logical thinking processes, impairing their ability to make safe judgements which ultimately effects their risk taking behaviour. Further research is needed to evaluate this possibility.

Positive urgency is thought of as the extent to which a person is susceptible to rash behaviour while in a positive mood state (Cyders, 2007). The current study sought to explore exactly that hypothesis, but as it applies to all children, while also determining whether this trait
placed a child at further risk for injury through even greater risk taking. The existence of a positive urgency trait has not been well tested among young children. While strong evidence exists that the positive urgency trait predicts more problematic drinking, sexual, drug-use, and gambling behaviour in adolescents and adults (Cyders & Smith, 2008a; Cyders, Flory, Rainer, & Smith, 2009; Zapolski, Cyders, & Smith, 2009), in the current research, children who scored higher on the positive urgency measure did not engage in greater risk taking. Further, scoring high on positive urgency did not change how a child reacted to the mood induction procedure, such that their mood ratings were quite similar to their peers who scored lower on positive urgency. This is consistent with previous research which has noted a tendency for individuals high on positive urgency to act rashly during the experience of positive emotions, but not a tendency to experience emotions more often or more intensely (Cyders et al., 2010). Past research by Riley (2004) established that school-aged children are able to accurately monitor and self-report on their internal experiences of health. However, it is possible that reflecting and reporting on their behaviour as a function of mood may be more difficult to accurately capture in self-report measures. Future research should seek to understand the presence of positive urgency in childhood and how to accurately capture qualities of the trait in young children, as the pattern of the current findings does suggest that positive urgency either does not exist during early childhood (i.e., it develops later in life) or that it does not operate in the same way during childhood as it does by the time later adolescents is reached. Suffice it to say, positive urgency was not a factor that affected risk taking in the current study.

**Practical Implications**

The findings establish that children engage in more risk taking when in a heightened positive mood. This highlights the need for parental supervision during a time when supervision
is often diminishing. We know parents of school-aged children are often confused about appropriate supervision levels (Peterson et al., 1993), and the current findings provide strong evidence for not only clarifying the issue but also implementing more stringent supervision practices. School-aged children are looking to develop their autonomy, and as a result, parents are replaced by peers, particularly during play. Given that we could reasonably expect peer interactions to also elevate children’s moods, it may be exactly these moments in which supervision is needed the most.

**Limitations and Future Research**

There are some limitations of this study that should be recognized and reconciled through future research. It is important to note that the majority of the sample was Caucasian and had a household income over $80,000 a year. Research has found that there is a difference in parental knowledge of safety issues related to socioeconomic status (Colley, 1994). As such dissemination of these findings while important for all families, may be particularly critical in lower-income neighborhoods where families may have less knowledge regarding the importance of supervision. Although it is anticipated that the effects of positive mood on risk taking would likely be equivalent across less homogeneous samples, future research should seek to confirm this hypothesis to gain a broader and more comprehensive understanding of how mood influences risk taking in all children.

An important question facing most experimental research is whether or not behaviour within the lab setting is a good indicator of behaviour outside of this setting. While every attempt was made to create realistic scenarios, the current situation was contrived and, as such, the findings may not generalize to how children behave in completely natural situations. To fully appreciate the influence of positive mood on childhood risk taking, future research should seek
to examine how naturally occurring elevated positive mood states (e.g., when playing with friends) influences risk taking in real world settings such as on playgrounds.

Further, while these findings outline the critical role current mood state has on a school-age child’s injury risk, conclusions have been based solely on the effects of positive mood. To obtain a mutually-exclusive understanding of mood influences on risk taking, the impact of negative mood should also be explored. The current literature outlining the effects of negative mood is quite sparse (Yuen & Lee, 2002), although in 2006 Zhao found that individuals in a negatively induced mood state took greater (non-injurious) risks than those in a positive mood. Exploring how negative mood states may influence risk taking decisions and behaviours that can lead to injury is an important next step to furthering this literature.

Finally, findings from this study have produced hypotheses and questions about the implications around mood, risk, and subsequently peer presence. The current study makes the logical connection that the presence of peers will likely increase mood, and in fact existing literature supports this notion, though a concept known as “mood contagion” (Neumann & Strack, 2000). Positive emotion may be unconsciously spread throughout a group of individuals, which may explain in part, why being with peers is associated with greater risk taking and more frequent injury. To gain a more extensive understanding of the role of positive emotion and peers in risk taking, it is critical that future research is directed towards a simultaneous examination of these factors.

**Conclusions**

False positive feedback presented to children during the playing of a novel videogame was conducive for producing an experimentally induced positive mood state. The results of this study are preliminary, however they provide strong evidence for the potentially harmful effects
of positive mood on children’s risk taking. Moreover, once in an induced positive mood, children increased both their intentions to risk take as well as behaved more recklessly while running through an obstacle course. Rating higher on a measure of positive urgency did not predict risk taking while in a positive mood. Thus, positive mood may play a critical and perhaps detrimental role in a child’s ability to make rational or safe decisions about risk taking. These findings have important implications with regard to supervision needs of school-aged children.
References


Colley, L. (1994). Different background, different information needs. Home safety awareness


Prevention, 39, 618-623.


Table 1

*Descriptive Statistics for Mood Change via Mood Induction Procedure*

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Table 2

*Descriptive Statistics for Risk Taking Change in Positive and Neutral Mood State*

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<td>SD</td>
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Table 3

*Descriptive Statistics for Risk Taking Across both Risk Taking Tasks*

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Appendix A
Appendix B

Does Mood Influence Children’s Risk-Taking Decisions?

Investigators:

Project Director:  Graduate Student:
Professor Barbara Morrongiello, Ph. D.  Julia Stewart, MA in Progress
Director of the Child Development Research Unit  Clinical Psychology: Applied Developmental
Department of Psychology, University of Guelph  Emphasis
(519)824-4120 ext. 53086  Blackwood Hall, Room 211

Parent Consent Form

Purpose

This project is being conducted at the Child Development Research Unit at the University of Guelph and is investigating whether being in an excited and happy mood leads children to take greater physical risks and do things that could result in injury.

Procedure

If you volunteer to participate in this study we would ask you to do the following:

You and your child will be asked to fill out a few short questionnaires about your family and your child’s behaviour, particularly around risk taking, and mood. Your child will also be asked to do two activities that we use to assess risk taking decisions, including (1) picture sorting task where they will look at pictures of kids on playgrounds and decide whether they themselves would or would not perform those behaviours if they had to make a video, and (2) to go through an obstacle course with their behavior being videotaped so we can later code how quickly and carefully they completed the course. To evoke a highly positive mood state, they will also be asked to play a fun video game to earn points and the game will be set up so they earn a ‘Top Score’ and set a ‘New Record’, which typically evokes a very positive and excited mood state; we will confirm this by having your child complete a task where they tell us how they feel. By having children complete the risk decision tasks before and after playing the mood evoking game we will be able to determine if being in an excited and happy mood leads children to take greater physical risks and do things that could result in injury.

Potential Risks, Benefits, Compensations and Results

Your participation and that of your child is voluntary and the potential risks are minimal. It is possible that you or your child may experience discomfort while answering questionnaires; however you are never obligated to answer any questions that you would prefer not to, and your child is told this too. When your child completes the obstacle course there is the possibility s/he may trip or fall but every effort has been taken to use gym safety mats on surfaces to prevent injury. We have used this obstacle course in previous research and children did not experience
any injuries but, of course, there is no absolute guarantee that your child might not experience a
minor bump or bruise when completing this task.

By completing these questionnaires, you will be helping us gain a greater understanding of
parenting practices and child risk taking but you may choose to leave a particular question blank
if you feel uncomfortable answering it. As a token of our appreciation your child will be able to
choose a $5.00 gift card from a selection of cards that can be used at local stores and facilities
around Guelph.

**Confidentiality, Participation and Withdrawal**

Every effort will be made to ensure confidentiality of any identifying information that is obtained
in connection with this study. Your responses to the questions will be kept strictly confidential
and your name will not be given to anyone, to the extent allowable by law, or appear on your
data that is collected. The completed questionnaires will be stored in a secure manner for five
years, as specified by the Canadian Psychological Association research and ethics guidelines
(online questionnaires are stored on a secure server). The video record of your child completing
the obstacle course will only be seen by those affiliated with the research project, will be stored
on a password protected computer, and destroyed five years after publication, as recommended
by the Canadian Psychological Association.

If you decide to participate, you may withdraw at any time without any consequences. You may
exercise the option to remove your data from the study. You may also refuse to answer any
questions you do not want to answer, and still remain in the study. The investigator may
withdraw you from this research if circumstances arise that warrant doing so.

A newsletter reporting the results will be made available online and mailed to all parents upon
completion of the study.

**Rights**

You may withdraw your consent at any time and discontinue participation without penalty. You
are not waiving any legal claims, rights or remedies because of your participation in this research
study. This project has been reviewed and received ethics clearance through the University of
Guelph Research Ethics Board.

If you have questions regarding your rights as a research participant, contact:

**Research Ethics Coordinator**
University of Guelph
437 University Centre
Guelph, ON N1G 2W1

**Telephone:** (519)824-4120 ext. 56606
**Email:** sauld@uoguelph.ca
**Fax:** (519)821-5236

If you have any questions or comments concerning the procedure or purpose of this study, please feel
free to ask a research assistant at any time.
The purpose of this study has been explained to me, and I have been given the opportunity to ask any questions I may have about this research. I understand the procedures and that my child and myself can withdraw from the study at any time without penalty, even after participation has begun. If either of us withdraws, my child will still receive a gift card.

My signature below indicates my willingness to have me and my child participate in this study.
Appendix C

ASSENT FORM FOR CHILDREN

Understanding Children’s Play Decisions

Researcher Names:

Dr. Barbara Morrongiello
Julia Stewart

Why you are here:

We are doing a study to understand the kinds of things that children your age like to do and how mood influences these decisions.

Why are they doing this study?

The researchers want to learn about how children’s feelings influence what they decide to do in different situations.

What will happen to you?

If you want to be in this study a few things will happen:

1. Today you and your parent will fill out some questionnaires and answer some questions about you.

2. You will be asked to go through an obstacle course and to look at pictures of kids playing on a playground, and you will do these things a few times. We will be videotaping you while you go through the obstacle course but only our researchers will see this video.

3. You will play a video game and try to earn a high score.

4. At the end you will receive a gift card for $5.00 and you can pick which place you want a card for (e.g., Dairy Queen, Gopher Golf, etc)

Will the study help you?

The study is not meant to help you directly, but in the future it might help in developing a program to educate children so they make better decisions during play that reduce their risk of getting hurt.
Who will see my answers?

Only the researchers will know what your answers are. Your parents will find out about what the study finds about ALL children in the study, but they will not be told how you answered any of the questions or how you did our activities during the study.

What if you have any questions?

You can ask questions any time, now or later. You can talk to the researchers or your family about these questions.

Do you have to be in this study?

You do not have to be in the study. No one will be mad at you if you don’t want to do this. If you don’t want to be in this study just say so. Even if you say yes now, you can change your mind later. It’s up to you and you will still get a gift card if you decide to stop participating at any point.

I want to be in this study

Print name of Child

Signature of Child  Age  Date

Signature of Person Obtaining Assent  Date
The debriefing will take the form of an individual discussion with the child.

First of all we at the Child Development Research Unit want to say thank you for helping us with our very important research project. We hope that you enjoyed helping us as much as we enjoyed working with you. You did a great job.

I would like to tell you a bit more about the project and explain what we were doing and why you had to do some of those activities several times.

Every day kids are hurt and sometimes very seriously because of doing risky things when they are playing. We know that some of the time these risky things are done when children are just feeling very excited and happy. What we are doing is studying if most children do risky things when they are in a really positive and excited mood.

So when you played that Pinata Video Game to earn stars we tried to be sure you would have a good time doing it so you would feel in a positive mood. So I was really encouraging and positive and you did it a few times so your score would get better and better, and you would feel happier. Then when you were really excited and happy, we had you repeat the obstacle course and the video viewing task so we could see how you did before you were really excited compared to when you were really excited.

I hope you had fun today. Any questions for us about anything that happened today? Remember there are no silly questions.