“Practice What You Preach”: Induced Hypocrisy as an Intervention Strategy to Reduce Children’s Intentions to Risk Take on Playgrounds

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Objective  An intervention based on induced hypocrisy was conducted to reduce children’s intentions to show fall-risk behaviors on playground equipment.  Methods  To induce hypocrisy participants (7–12 years) advocated for safe-play behaviors while being made mindful about past failures to play safely on playgrounds. To measure the impact of the intervention, children created posters indicating which playground behaviors they Would Do and Would Not Do; children believed they would have to demonstrate the behaviors endorsed on their posters.  Results  The intervention resulted in significant reductions in the risk behaviors children endorsed both for risk behaviors targeted (specific effects) and nontargeted risk behaviors (generalized effects). Assessing the mechanism by which the intervention produced changes in behavioral intentions revealed it yielded changes in cognitions that predicted subsequent reductions in risk-taking intentions.  Conclusions  The present intervention was successful in reducing children’s intentions to engage in risky playground behaviors and it did so by changing cognitions.

Key words  children; fall prevention; playground injury; program evaluation; risk behaviors.

Injuries on Playgrounds

Unintentional injuries are the leading cause of death for North American youth 1–18 years of age (Canadian Institute of Child Health, 2000; National Center for Injury Prevention and Control, 2005). For elementary school children, many injuries occur when playing away from home, such as on public playgrounds (Canadian Institute of Child Health, 2000; Safe Kids Canada, 2007). The monkey bars, slides, swings, play structures, and seesaws are implicated in 90% of all playground injuries (Canadian Hospitals Injury Reporting and Prevention Program, 1997; Tinsworth & McDonald, 2001), particularly falls (Bernardo, Gardner, & Seibel, 2001; Canadian Institute of Child Health, 2000). In fact, falls account for 75% of all playground injuries and these are more severe than injuries due to other causes (Phelan, Khoury, Kalkwarf, & Lanphere, 2001). To address this issue, the aim of the present study was to develop an intervention to reduce children’s intentions to engage in fall-risk behaviors on playgrounds.

Historically, efforts to reduce playground injuries have focused on environmental modifications (Tucker & Healy, 2006). Reducing the height of equipment and increasing the impact absorbency of the subsurface material (Laforest, Robitaille, Lesage, & Dorval, 2001; MacArthur, Hu, Wesson, & Parkin, 2000) reduces children’s risk of injury, and playground safety standards have been modified accordingly (Canadian Standards Association, 1998; U.S Consumer Product Safety, 1997). Upgrading playgrounds to meet new safety standards is costly, resulting in poor compliance with standards (Lesage, Robitaille, Dorval, & Beaule, 1995; Pickett, Carr, Mowat, & Chui, 1996). Moreover, children fall and hurt themselves even on playgrounds that meet safety standards (Mott et al., 1994). Thus, there is a clear need for intervention programs that reduce children’s risk taking, in order to complement those focusing on environmental modifications of playgrounds. Empirical evidence about factors that affect children’s risk decisions provides insights into what to target in developing such programs.

Determinants of Children’s Risk Taking

Children’s risk taking is influenced both by what they think and what they feel. Children who think of...
themselves as vulnerable to injury, judge the behavior as dangerous, and rate the potential injury as severe, generally avoid risk taking, whereas risk takers possess the opposing characteristics (Hillier & Morrongiello, 1998; Morrongiello, 1997; Morrongiello & Matheis, 2004; Morrongiello & Rennie, 1998; Morrongiello & Sedore, 2005; Peterson, Brazeal, Oliver, & Bull, 1997). With regard to emotional reactions, excitement predicts children’s risk taking, whereas fear predicts risk avoidance (Morrongiello & Matheis, 2004; Morrongiello & Sedore, 2005; Peterson, Gillies, Cook, Schick, & Little, 1994). Thus, both cognitions and emotions are potential targets for programs to reduce children’s risk taking. Research suggests also, however, that targeting emotions may yield differential effectiveness depending on the personality attribute of sensation seeking.

Sensation seeking is a trait associated with thrill-seeking behaviors and the need for risk exposure. Those scoring high in sensation seeking experience excitement rather than fear in risk situations and engage in more risk taking as an adult (Zuckerman, 2007), adolescent (Barnea, Teichman, & Rahar, 1992; Clayton, Cattarello, & Walden, 1991), or school-age child (Morrongiello & Lasenby, 2006; Morrongiello & Sedore, 2005). Interventions for adolescents that target emotions have proven particularly effective to reduce risk taking for those high in sensation seeking (Everett & Palmgreen, 1995; Lorch et al., 1994; Palmgreen et al., 1991). A recent evaluation of a behavioral intervention aimed at reducing fall-risk behaviors on playgrounds among school-age children also found that program effectiveness varied with level of sensation seeking. The affect-arousing program (i.e., audio-taped exposure to an age-mate providing sound effects to indicate falling and experiencing a severe playground injury) yielded a greater reduction in risk taking among children high in sensation seeking compared with those lower in sensation seeking (Morrongiello & Matheis, 2007). The present study sought to develop an intervention that was comparably effective, regardless of level of sensation seeking. Toward this aim, we targeted children’s cognitions rather than emotions and did so using an induced-hypocrisy paradigm.

**Induced Hypocrisy as an Approach to Reduce Risk Behaviors**

The induced-hypocrisy paradigm is based on Dissonance Theory, which states that when a person preaches one thing but does another the person experiences feelings of dissonance (Aronson, 1992, 1999). Because such dissonant or hypocritical feelings are unpleasant and undermine self-concept, the person becomes motivated to change his/her behavior in order to reduce these negative feelings; the validity of this approach has been confirmed (Aronson, 1999).

In previous research with adolescents and adults the use of induced hypocrisy has proven an effective means of: increasing the use of condoms (Ethel & Friend, 1999), promoting recycling behaviors (Fried & Aronson, 1995), creating favorable attitudes towards obeying speed limits (Fointiat, 2004), reducing prejudicial behaviors among aversive racists (Son Hing, Li, & Zanna, 2002), promoting water conservation (Dickerson, Thibodeau, Aronson, & Miller, 1992), and increasing positive attitudes towards the cessation of smoking (Simmons, Webb, & Brandon, 2004). The present study provided the first test of the applicability of this intervention approach for injury prevention among elementary-school children.

**Present Study**

Two essential elements of the induced hypocrisy paradigm were incorporated into this study (Spangenberg & Greenwald, 2001): (a) children were made mindful of their past behavior by being asked to generate a list of risky playground behaviors, and (b) an advocacy condition was created by asking children to sign a poster about safe play and to create an audio-taped “radio commercial” advocating for avoiding risky playground behaviors. Effectiveness was measured by comparing pre- with post-intervention indices of intentions to risk take. Initially (Session 1) children made posters indicating the behaviors they Would Do and Would Not Do, with one poster completed for each of four different pieces of playground equipment; prior research indicates that what children report on an intentions-to-risk-take task corresponds closely with how they actually behave (Morrongiello, 2004). After the intervention (Session 2) children were allowed to make changes to their posters in order to determine whether the intervention reduced children’s intentions to risk take; children also were given an additional opportunity to change their posters a month later (Session 3). To identify the mechanism by which the intervention produced changes in risk-taking intentions, we compared children’s cognition ratings (danger, vulnerability, potential injury severity) after the intervention (Session 2) with ratings given before. In addition, we assessed whether the intervention reduced risk-taking intentions only for the specific behaviors targeted or
produced more generalized effects (i.e., reductions in children’s intentions to perform risk behaviors not directly targeted). Finally, we explored if child attributes [fear of negative evaluation (FNE), sensation seeking] differentially influenced program effectiveness.

**Method**

**Participants**

Children were recruited from five schools in Guelph Ontario, with schools selected in a purposeful way to obtain a diverse sampling of socioeconomic groups at each school; type and cost of local housing (i.e., rental, attached townhouses, detached homes) were used as proxy indicators of economic status, but no specific information about economic status was obtained. In each school, classes were recruited and then randomly assigned to the intervention or control condition. If there was more than one class at a grade then they were both designated to the same condition; this was done to reduce the risk of cross-contamination between intervention and control groups because teachers and children reported that it was more likely students would play with grade mates in other classes than with children in other grades. All children were developing normally, fluent in English, and in regular classrooms.

The sample included 239 students, including 138 children in the intervention condition and 101 children in the control condition, with the same age ranges and grades represented (7–13 years, grades 2–6) for both conditions; there were no age differences across conditions for any of the three age groups (p > .05). Specifically, for the intervention condition the 138 children were distributed into three age groups: younger (7- and 8-year-old; 48% male; M = 7.47 years, SD = 0.50 years), intermediate (9- and 10-year-old; 44% male; M = 9.43 years, SD = 0.50 years), and older (11- and 12-year-old; 48% male; M = 11.37 years, SD = 0.38 years). The control sample of 101 children included children in the same age groups: younger (47% male; M = 7.58 years, SD = 0.50 years), intermediate (48% male; M = 9.22 years, SD = 0.42 years), and older (48% male; M = 11.53 years, SD = 0.61 years). The majority (98%) of participants were Caucasian.

For recruitment, information letters were sent home. A passive consent procedure was implemented requiring that those parents who did not want their child to participate complete and return a form to the child’s teacher. After parental consent was granted, written consent also was obtained from each child; virtually all children who were invited to participate did so (99% participation rate).

**Materials**

**Poster Materials**

To create the color risk-taking photos (20 cm × 25 cm) for placement on posters, naturalistic observations were conducted to identify two low risk (i.e., appropriate use of equipment), two moderate risk (i.e., inappropriate use that could lead to a fall), and two high risk (i.e., improper use that was very likely to result in a fall, or was observed to do so) behaviors children frequently showed while playing on swings, slides, climbers, and see-saws (extensive information about poster materials is provided in Morrongiello & Matheis, 2007, who used these same materials in testing a different type of intervention on a different sample). Color photographs of female and male child actors performing these behaviors were taken and used to create a set of 24 male (2 photos × 3 risk levels × 4 equipment types) and 24 female photos that were the same except for the child shown. Four posters (70 cm × 40 cm), one per equipment type, each were divided to have two headings: “Things I Would Do” and “Things I Would Not Do,” laminated for durability, and had Velcro strips for affixing the photos to the poster.

**Rating Scales**

Separate 5-point Likert scales (1 = not, 5 = very) were made for each of the ratings children were asked to give: perceived danger (e.g., How dangerous do you think it is to do this?), perceived vulnerability to injury (e.g., How likely do you think you are to get hurt doing this?), severity of a possible injury (e.g., How hurt might you get doing this?), and skill level for the equipment shown (e.g., How good are you at playing on the climber?). Scales comprised both words and corresponding graphics of cups containing liquid at varying levels (Morrongiello & Rennie, 1998). These scales were drawn on poster board that was then laminated, and were placed in front of the child, when appropriate. The examiner used a 4-point Likert Scale (1 = poor; 4 = excellent) to rate both the child’s attention to and understanding of the task; the original plan was to exclude anyone with ratings of 1, but no child received this rating.

**Cognitive Intervention Materials**

As part of the induced-hypocrisy manipulation children were asked to generate a list of past risky playground behaviors, endorse (sign) a Safe Play on Playgrounds poster, and make a hypothetical “radio commercial” advocating for safe playground play.
To help remind children of possible past risky playground behaviors they were given a short list that included one each of the moderate and high-risk behaviors (randomly selected) from each piece of equipment plus two other behaviors. This list was typed for the child. To make the list of past risky behavior, the child was given a sheet of paper with the title “(child’s name)’s List of Risky Playground Behaviors” at the top and lines underneath.

The Safe Play on Playgrounds poster (70 cm × 40 cm) was made of poster board and displayed pictures of children and playground equipment along with the following: “Getting injured is not fun. All children need to be cautious and play safely on playgrounds. Doing risky things that can make you fall is silly. Play safe to be safe and avoid falling on playgrounds! Getting injured hurts and is not fun.” The poster was laminated and the child signed the poster with a dry-erase marker so that the signature could be wiped off before the next participant.

For making their audio-taped ‘radio commercial’ about playing safe on playgrounds, children were presented with a list containing three different categories of information to be used as part of the radio commercial. The first category contained true facts about playground equipment injuries (Tucker and Healy, 2006) and the child chose at least one of these four facts to include (e.g., Most kids get hurt because they fall from playground equipment). The second group contained three slogans about playing safe and avoiding risky behavior on playgrounds and the child chose at least one of these to use in the commercial (e.g., NEVER do risky things on playground equipment that might make you fall). The final section consisted of a list of behaviors presented under the heading of “Risky Things You Should Not Do.” Unbeknownst to the participant this list actually contained descriptions of moderate- and/or high-risk activities they had previously endorsed on their posters. If a child indicated s/he would perform more than one of the moderate- or high-risk behaviors, then one of these was randomly chosen to test the generalizability of the intervention to risk behaviors that were not targeted directly, and the remainder was targeted in the intervention. If a child indicated s/he would engage in both moderate- and high-risk behaviors, then the high-risk behavior was targeted. If the child indicated that s/he would perform only one of the moderate- or high-risk behaviors, then that activity was automatically included in the intervention. The resulting list contained up to four behaviors for the child to include in the radio commercial and the child was instructed to mention all of these. The child also was asked to say the heading “Risky Things You Should Not Do” and the closing line “Because You Can Get Badly Hurt” as part of the commercial.

**Questionnaires**

The FNE Scale (30 items; Watson & Friend, 1969) provides a measure of how much anxiety a child experiences at the idea of another evaluating them negatively. Participants indicated on a 5-point scale how characteristic of them each item was ($\alpha = .90$). Children also completed the Sensation Seeking Scale for children (Morrongiello & Lasenby, 2006) in which they were presented opposing statements and chose the one that best described them for each of 27 items ($\alpha = .81$).

**Procedure**

All procedures were reviewed and approved by the Ethics Review Board at the university and at the school board. There were three sessions and a different procedure was followed in each (Table I). Children in the intervention group ($n = 121$ after 17 children were excluded for failing to complete all components of the intervention) received all three sessions and those in the control condition ($n = 101$) only received Sessions 1 and 3; the procedures were the same for the control and intervention groups. Testers could surmise which group a child was in, but all aspects of the procedure were structured and the interview was completely scripted, with most parts audio recorded for later coding of responses and checking the integrity of the testing protocol.

**Session 1**

Data collection took place in schools, with each child seen individually. In each group, half the children at a grade were randomly assigned to complete the questionnaires in Session 1 before the poster task and half completed them in Session 3 after the poster task.

Children were told that they were going to be making posters about playing on playground equipment using photos provided. They were told they could place the photos anywhere on the poster and did not have to use both the Would Do and Would Not Do side. Children were instructed to only put things on the Would Do side that they truly would do because the research assistant would be asking children at a later time to do those things on a playground; this statement was made to ensure that children were thinking carefully and would respond truthfully about which behaviors they actually would do. Each participant was then presented with a poster; the four posters were randomly ordered for each child.
The child was then shown each of the six photos corresponding to that poster (i.e., piece of equipment), one at a time, with the research assistant providing a brief description of the behavior depicted in the photo. Once all six had been described, the research assistant then gave the photos to the child; the research assistant appeared to be busy with paperwork while the child placed the pictures on the poster. This same procedure was repeated until all four posters were completed. These picture placements constituted baseline or preintervention data.

Upon completion of the four posters each child was interviewed (audio-recorded) about the behaviors placed on the Would Do and Would Not Do sides. During the interview each child used the rating scales to judge danger, vulnerability, and injury severity for each of the photos, and also rated their level of skill overall for the equipment shown. Participants were then given a small gift and the assistant then rated both the child’s attention and understanding of the task.

**Session 2**

On average the intervention was completed 21 days after Session 1 ($SD = 6.32$). Many children in the intervention group also provided data to test the generalizability of the intervention effect (i.e., was there a reduction in risk behaviors not specifically targeted). Specifically, for those children who endorsed exactly two risk (moderate or high) behaviors on a piece of equipment, one was chosen randomly as a test of generalizability and the remaining behaviors became the focus of the intervention. If a child endorsed only one risk (moderate or high) behavior, then that behavior was targeted in the intervention, resulting in no behaviors available for testing generalizability effects. Thus, the intervention that was delivered in Session 2 was tailored based on the behaviors endorsed in Session 1, and when there were sufficient risk behaviors endorsed, then some were not targeted so that we could assess for generalizability of intervention effects.

Participants worked with a different assistant than in Session 1; this was done so the child would feel free to decide for him/herself what prior risk behaviors to admit to because presumably the research assistant did not know what behaviors s/he had endorsed in Session 1. Interview sections of the session were audio-taped. The induced-hypocrisy intervention comprised three parts: generation of a list of previous risky behaviors, signing of the Safe Play on Playgrounds poster, and making a radio commercial advocating for safe play.

For purposes of having the child recall risky behaviors, participants were told that the examiner needed their help to create a list of risky playground behaviors. Each child was given his/her personalized sheet and asked to list as many risky playground behaviors s/he could recall doing. Subsequently, a list of example behaviors was presented and the child was asked to indicate if there were any here to add to his/her list. Two children did not

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*FNE, fear of negative evaluation; SSSC, Sensation Seeking Scale for children.

bOne poster per type of playground equipment (slide, swing, seesaw, climber).

cDanger, vulnerability for injury, potential injury severity.

dA separate rating of skill level was given by the child for each type of equipment shown.

Recall past risk behaviors advocate for safe playground play (sign a safe play on playgrounds poster, make a radio commercial).
admit to engaging in any risky behaviors and were excluded for not completing the intervention.

The child was then asked whether or not s/he would be willing to be the first to sign a Safe Play on Playgrounds poster. The assistant read the child the poster and told her/him that s/he did not have to sign (Fointiat, 2004), but if s/he agreed with the statements made on it then s/he might consider signing as a show of support for the message listed. Only three children chose not to sign and were excluded for failing to complete the intervention.

As a second advocacy component participants were told that the researchers needed the child’s help making a radio-type commercial. Children were given the option of making one of two types of ads, making their choice completely volitional (Fointiat, 2004). They could make an ad about activities they liked to do after school or about playground safety. The child was told that it would be helpful if s/he chose the playground safety commercial (e.g., more good commercials about playground safety were still needed), but the choice was his/her. Only 12 participants chose the after school activity; these children were excluded for failing to complete the intervention.

Participants who chose to make the playground safety commercial were given the script sheet described in the Materials section. For the radio commercial, children were told they needed to get the attention of other children and convince them of the importance of not doing risky things that could lead to falls from playground equipment. The child practiced the commercial before recording it and was then congratulated for making a good commercial.

Next the child was given, one at a time in random order, each of the four posters s/he made in Session 1. S/he was asked to check these over carefully because photos sometimes fall off and get put in the wrong place. The child was also told that s/he did not have to make changes but now was the time to do so if desired. The child was reminded to give careful consideration to the photos on the Would Do side because s/he would be asked to demonstrate these behaviors at a later time. To ensure that the child was carefully considering photo placement, s/he was told to sign her/his name on that side once the picture placement was finalized. While the child looked over the poster, the research assistant appeared distracted with his/her back to the child. If the child moved any of the pictures from the Would Do to the Would Not Do side s/he was asked to give ratings about the behaviors (danger, vulnerability, severity). Participants were then given another small gift. After the session the research assistant recorded the placement of the pictures on each poster, which served as an immediate measure of the intervention’s effectiveness. The research assistant again assigned the child scores for attention and for understanding of the task.

Session 3
This session took place an average of 1 month after Session 2 (M = 29.82 days, SD = 4.92). For children in the intervention group, this provided a measure of whether reductions in risk taking in reaction to the intervention in Session 2 were maintained 1 month later. For children in the control group this session provided an index of spontaneous changes in photo positioning. Children were removed from the classroom and again worked individually with a research assistant. The procedure was the same for both the control and intervention participants but the positioning of the photos on the posters differed slightly: for the control group the pictures were arranged as they appeared after the first session, whereas for the intervention group the photos were arranged as they appeared after Session 2 (i.e., following the intervention).

Children were given their posters in random order and asked to review these because sometimes photos fall off and get put in the wrong place. They were also told that they did not have to make any changes, but if they wanted to, now was their chance to do so. The participants were reminded only to put things on the Would Do side that they would actually do because they were going to be asked to demonstrate these behaviors at a later date. Once picture placement was finalized, they were asked to sign the Would Do side to confirm the behaviors indicated. After completing all posters, any child who changed pictures from the Would Do to the Would Not Do side were asked to provide ratings (danger, vulnerability, severity). Additionally, children who were assigned to complete questionnaires in Session 3 did so at this time. Subsequently, the child was given a small gift, and the assistant then gave the child ratings for attention and for understanding. After all participants at a school completed testing, children were debriefed about the study by a class presentation and discussion.

Data Coding
To compute a risk-taking intentions score, photos placed on the Would Do side of each poster were assigned numeric values (1 = no, 2 = moderate, 3 = high risk photo). Summing across posters resulted in one total score, which could range from zero (endorsed no behaviors) to 48 (endorsed all pictures on all four pieces of equipment), with higher
numbers indicating greater intentions to risk take. Scores were summed across equipment for ease of analysis.

Results
Assistant ratings indicated that children completed the tasks with a high level of understanding (M = 3.76, SD = 0.39) and attention (M = 3.78, SD = 0.40). There were no floor or ceiling effects in risk-taking intentions score, indicating that the risk-taking behaviors provided were applicable across this broad age range.

Predicting Initial Risk-taking Intentions
A preliminary Analysis of Variance (ANOVA) test indicated that there were no significant group, age, or sex differences in initial risk taking. Hence, data from the entire sample (control and intervention) were included in identifying predictors of initial risk-taking intentions. Children’s danger, vulnerability, and injury severity ratings for pictures they Would Not Do, as well as skill ratings for each piece of equipment, were summed across the four types of equipment for Session 1 (max score = 20 for each of the four ratings) and a hierarchical regression was conducted to identify if any of these predicted initial risk-taking intentions after controlling for effects of age and sex in Step 1. Initial screening for distribution issues and multicollinearity did not indicate any concerns (Tabachnik & Fidell, 1989). Intercorrelations are given in Table II and regression results in Table III; adjusted $r^2$ values are reported.

As can be seen in Table III, age and sex did not add significantly to the model, but Step 2 was significant, $F (5, 231) = 17.79, p < .001$. The final model predicted 28% of variance in initial risk-taking intentions, with lower danger ratings and higher skill ratings each predicting greater intentions to risk take ($r = -2.82$ and 2.45, respectively, $p < .05$).

Testing for Effects of the Intervention
Subsequent analyses were limited to data from the intervention group. Fully 105 of the 121 children (87%) in the intervention condition moved at least one picture from the Would Do side of their poster to the Would Not Do side, whereas in the control condition only 20% of the 101 children (N = 20) did so, which was a significant difference, $x^2 (1) = 100.37, p < .001$. In the intervention group, the average percentage of risk pictures moved to the Would Not Do side was 38% (SD = 29%), whereas control children moved only 13% (SD = 26%) of these, $t (211) = 5.66, p < .01, d = .56, Cl.95 = .03, .09$. An ANOVA with Group (2) $\times$ Age (3) $\times$ Sex (2) as between-participant factors was applied to the change in risk-taking intentions score (i.e., Session 2 score minus Session 1 score, so a positive score indicates a reduction in intentions to risk take). A significant effect of group [$F(1, 207) = 10.08, p < .01, d = .38, Cl.95 = 1.10, 2.32$] confirmed that the reduction in intentions to risk take for children in the intervention group was significantly greater than that for the control group (M = 3.22 and 0.59, SD = 3.20 and 3.30, respectively). Consistent with this decrease in risk taking in the intervention group, these children showed increases in danger ratings from Sessions 1 to 2 [M = 4.68 and 8.74, SD = 11.36 and 8.23, respectively; $F(1, 98) = 37.90, p < .01, d = .58, Cl.95 = 2.90, 5.79$], as well as in vulnerability ratings [M = 0.74 and 8.82, SD = 8.36 and 11.62, respectively; $F(1, 98) = 29.67, p < .01, d = .51, Cl.95 = 2.74, 6.04$] and severity ratings [M = 4.94 and 9.18, SD = 8.36

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$^a$1, female; 2, male.
*p < .05, **p < .01.
and 11.66, respectively, $F(1, 98) = 26.35$, $p < .01$, $d = .49$, CI$_{95} = 2.71, 6.32$.

For the children in the intervention condition, two percentage scores were calculated to evaluate the scope of the intervention. First, the percentage of all pictures moved to the Would Not Do side that were targeted in the intervention, which gave an indication of the specificity of the effect of the intervention. Second, the percentage of all pictures moved to the Would Not Do side that were not targeted in the intervention, which gave an indication of generalization effects of the intervention. One sample $t$-tests were performed comparing each of the percentage of pictures moved (targeted and nontargeted) to a hypothesized no change (no effect of intervention). The percentage of pictures moved that were targeted (59%) and those that were nontargeted (16%) were both significantly different from zero, $t = 11.95$ and $4.25$, $p < .01$, $d = 1.09$ and $.39$, CI$_{95} = .43, .59$ and $.00, .01$, respectively. Thus, the intervention produced both a specific effect (i.e., significantly reduced targeted risk behaviors) and a more generalized reduction in risk taking intentions for behaviors not targeted. Importantly, the effects of the intervention were maintained over time: only 13 of the 105 children who had moved a picture to the Would Not Do side after the intervention moved a picture back to the Would Do side at the follow-up Session 1 month later.

**Ratings Predicting a Generalized Reduction in Risk Taking**

Each intervention participant’s risk-taking intentions change score was calculated by subtracting the sum of his/her Would Do pictures after Session 1 from the sum of all Would Do pictures after Session 2; the higher this score, the greater the reduction in intentions to risk take after the intervention in Session 2. The ratings used as predictors of the ‘changed’ risk-taking intentions score were based on the danger, vulnerability, and severity ratings children gave; due to multicollinearity, however, an aggregate cognitive-rating change score was computed. The aggregate change score was determined by first summing the relevant ratings (e.g., all danger ratings for pictures moved from the Would Do to Would Not Do side of the poster after the intervention), then averaging the three summed scores (danger sum, vulnerability sum, severity sum) to obtain one aggregate score (range: 0–20), then subtracting this score for Session 2 from that for Session 1 to determine how much cognitive ratings increased after the intervention.

### Table IV. Inter-correlations between Predictors and Risk-taking Intentions Change Score for the Intervention Group

<table>
<thead>
<tr>
<th>Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. RT change</td>
<td>–</td>
<td>–.09</td>
<td>–.12</td>
<td>.03</td>
<td>.16</td>
<td>.83**</td>
</tr>
<tr>
<td>2. Sex*</td>
<td>–.01</td>
<td>–</td>
<td>.01</td>
<td>.07</td>
<td>–.03</td>
<td>.03</td>
</tr>
<tr>
<td>3. Age</td>
<td>–.08</td>
<td>–.04</td>
<td>–</td>
<td>–.09</td>
<td>–.07</td>
<td>–.20</td>
</tr>
<tr>
<td>4. SSSC</td>
<td>.03</td>
<td>.13</td>
<td>–.09</td>
<td>–</td>
<td>–.04</td>
<td>.18</td>
</tr>
<tr>
<td>5. FNE</td>
<td>.12</td>
<td>–.02</td>
<td>–.11</td>
<td>–.08</td>
<td>–</td>
<td>.02</td>
</tr>
<tr>
<td>6. Aggregate</td>
<td>.75**</td>
<td>–.03</td>
<td>–.20</td>
<td>.17</td>
<td>.21</td>
<td>–</td>
</tr>
</tbody>
</table>

Correlations above the diagonal show relations for all pictures moved and values below the diagonal show relations for only targeted pictures that were moved.

*1, female; 2, male.

**The aggregate is based on the three cognition ratings (danger, vulnerability, severity) and reflects the increase in ratings after the intervention (Session 2–Session 1 ratings).**

**p < .01.

### Table V. Summary of Hierarchical Regression Analysis for Variables Predicting Reductions in Risk-taking Intentions Score for All Pictures and Targeted-only Pictures for the Intervention Group

<table>
<thead>
<tr>
<th>Step Variable</th>
<th>B</th>
<th>SE B</th>
<th>$r^2$ change</th>
<th>B</th>
<th>SE B</th>
<th>$r^2$ change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All pictures</td>
<td>Targeted pictures only</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Age</td>
<td>.04</td>
<td>.66</td>
<td>.01</td>
<td>–</td>
<td>–</td>
<td>–.07 .33</td>
</tr>
<tr>
<td>Sex*</td>
<td>–1.78</td>
<td>1.04</td>
<td>–.22</td>
<td>–1.14</td>
<td>.51</td>
<td>–.27</td>
</tr>
<tr>
<td>2 Age</td>
<td>.89</td>
<td>.47</td>
<td>.10</td>
<td>–</td>
<td>–</td>
<td>.25 .16</td>
</tr>
<tr>
<td>Sex*</td>
<td>–.89</td>
<td>.76</td>
<td>–.11</td>
<td>–</td>
<td>–</td>
<td>–.61 .25</td>
</tr>
<tr>
<td>SSSC</td>
<td>–.12</td>
<td>.09</td>
<td>–.13</td>
<td>–</td>
<td>–</td>
<td>–.03 .03</td>
</tr>
<tr>
<td>FNE</td>
<td>1.30</td>
<td>.71</td>
<td>.17</td>
<td>–</td>
<td>–</td>
<td>–.09 .23</td>
</tr>
<tr>
<td>Aggregateb</td>
<td>.18</td>
<td>.03</td>
<td>.65**</td>
<td>–</td>
<td>–</td>
<td>.21 .02</td>
</tr>
</tbody>
</table>

*1, female; 2, male.

**The aggregate is based on the three cognition ratings (danger, vulnerability, severity) and reflects the increase in ratings after the intervention (Session 2–Session 1 ratings).**

*p < .05, **p < .01.

In a hierarchical regression, risk-taking intentions change scores were regressed on age and sex in Step 1 to control for these effects. Then the aggregate cognitive-change score, FNE score, and SSSC score, were entered in Step 2. A single outlier was removed. Inter-correlations are given in Table IV and regression results in Table V; adjusted $r^2$ values are reported.

Results revealed a significant Step 2, $F(5, 56) = 12.68$, $p < .01$. The aggregated cognitive-change variable was a significant predictor ($r = 6.68$, $p < .01$), with higher scores predicting a greater reduction in intentions to risk take after the intervention. With the aggregate cognitive-change variable, the final model predicted 53% of the variance in change in risk-taking intentions. FNE and SSSC scores did not contribute to the model.
Ratings Predicting Specificity of the Intervention Effect

Each intervention participant’s risk-taking intentions change score was calculated based only on the pictures that were explicitly targeted in the intervention (i.e., those pictures whose descriptions were used in the content of the child’s playground safety commercial); higher change scores indicate greater reduction in intentions to risk take following the intervention. Again, because of significant multicollinearity an aggregate variable was formed by averaging the summed scores for danger, vulnerability, and severity ratings for targeted and moved pictures ($M = 12.39, SD = 8.77$). In a hierarchical regression, risk-taking change scores for targeted pictures was regressed on age groups and sex in Step 1 to control for these variables. In Step 2, the aggregate cognitive-change score, FNE score, and SSSC score were entered. Intercorrelations appear in Table IV and regression results in Table V; adjusted $r^2$ values are reported.

Again, a significant Step 2 resulted, $F(3, 62) = 73.77, p < .01$. The final model predicted 78% of the variance and significant predictors included not only the aggregate cognitive-change variable ($t = 14.27, p < .01$) but also sex ($t = -2.47, p < .05$), with girls showing greater reductions in intentions to risk take than boys in response to the intervention. FNE and SSSC scores did not predict reductions in risk-taking intentions.

Discussion

Induced Hypocrisy as an Approach to Behavior Change

The present findings add to the accumulating evidence that induced hypocrisy can be a useful paradigm in intervention research. Past research confirms that this approach works to evoke changes to a broad variety of behaviors in adults and adolescents. The present study extends this research by demonstrating the usefulness of this approach for changing children’s injury-risk behaviors. To the best of our knowledge, this is the first study to demonstrate its applicability to effecting changes in children’s intentions to risk take. Moreover, the high rates of attention and understanding by participants indicate that the hypocrisy-induction tasks maintained children’s interest and were not too difficult for the younger children to complete.

The induced-hypocrisy intervention was effective to reduce children’s risk-taking intentions. The vast majority of children who received the intervention no longer intended to engage in risk behaviors they had previously endorsed. Specifically, after the intervention, children moved more than half of their targeted risk pictures to the Would Not Do side, whereas children in the control sample who did not receive the intervention spontaneously moved very few pictures. Additionally, the intervention produced both specific and more generalized changes in risk taking. Children not only planned to reduce risk behaviors explicitly targeted in the intervention, but also risk behaviors not targeted in the intervention. Thus, the impact of the intervention on risk cognitions seemingly led children to recognize the hazardous nature of similar risk behaviors, yielding a more generalized reduction in intentions to risk take. This is an important finding because behavioral interventions can seldom target all possible risk behaviors in a situation. Therefore, it is critical that intervention approaches be identified that can produce more generalized effects with respect to reducing risk taking. The present results suggest that a hypocrisy-induction approach may be one type of intervention that can achieve this goal.

Child Attributes and Program Effectiveness

Although FNE did not influence the extent of effectiveness of the present intervention, this null finding may be an artifact of our methodology. To eliminate children feeling coerced to change their risk-taking judgements, we purposefully used different testers across sessions so children would think that the tester was unaware of the hypocrisy between what they had endorsed and how they actually behaved. However, this may have eliminated any potential impact of FNE in this study because if the child believed the tester to not be aware of the hypocrisy, then there would be no basis for the child to think the tester might have a negative perception of him/her. Hence, it is possible that children who score high on the FNE measure are more susceptible to the hypocrisy manipulation than those less concerned about what others thought of them, but capturing this effect requires the same tester be used across sessions so the child believes the tester is aware of the hypocrisy and may hold a negative perception of him/her because of this.

The child’s level of sensation seeking did not influence the extent of effectiveness of the intervention. The fact that the intervention targeted cognitions rather than emotions presumably explains this result. Affect- arousing interventions are differentially effective for those high in sensation seeking (Everett & Palmgreen, 1995; Lorch et al., 1994; Morrongiello & Matheis, 2007; Palmgreen et al., 1991), however, there is no evidence of differential effectiveness due to sensation seeking when
cognitions are targeted. These findings suggest that if one wishes to limit an intervention to the high risk takers (i.e., high sensation seekers), then targeting emotions will likely maximize effectiveness, but for application to a broad range of children who vary in their extent of sensation seeking and risk taking, interventions targeting cognitions are more likely to be uniformly effective for this group.

**Task Selection**

Studying children’s physical risk taking is a challenge because of the difficulty of task selection. Because one cannot place children at risk of real injury, there is often little choice but to utilize an intentions-to-risk-take task. At least one test of validity confirms that what children report they intend to do closely corresponds to their actual risk taking (Morrongiello, 2004). In addition, indirect support for the validity of the current task is reflected in the fact that the present findings (i.e., danger and experience influence risk taking) were consistent with those found in prior studies that used different tasks to assess children’s risk taking (Morrongiello & Dawber, 2004; Morrongiello & Matheis, 2004; Morrongiello & Sedore, 2005; Peterson et al., 1997). The fact that results of a recent meta-analysis also reveal that effecting changes in behavioral intentions can lead to meaningful changes in behavior adds further support to the notion of a correspondence between intentions and behavior (Webb & Sheeran, 2006). Without doubt, utilizing an actual risk-taking task is ideal when studying children’s risk-taking decisions. However, when this is not possible, evidence suggests that it is reasonable to assume that an intentions-to-risk-take task can yield meaningful results and conclusions.

**Limitations and Directions for Future Research**

The present study yielded important findings about ways to reduce children’s intentions to risk take on playgrounds. Nonetheless, some limitations must be acknowledged and several design factors merit consideration in planning future research on this topic.

First, an intentions-to-risk-take task was used. It would be useful in future research to include some naturalistic observations before and after delivery of the intervention to confirm observable changes in risk behaviors on playgrounds. Second, effects of the intervention persisted through 1 month later. However, it is important to conduct longer-term follow-up testing to assess this question more extensively. Third, the present study utilized an intervention that was tailored to the specific risk behaviors endorsed by the child. In future research it would be informative to determine if the same reductions in risk-taking intentions can be obtained when a more generic intervention design is used that involves targeting risk behaviors that are not ones the child specifically endorsed. Finally, in future research it would be informative to determine what part of the hypocrisy-induction intervention (e.g., recalling risk behaviors, poster signing, radio commercial) was most responsible for the positive effects obtained so that the intervention can be streamlined to include only the most essential components. This process of dismantling or identifying the key aspects of a multicomponent program has proven important in therapy research in the field of clinical psychology (Baucom, 1982; Clingempeel & Henggleler, 2002; Feske & Goldstein, 1997). It can be challenging to design program evaluations that do this, but it is essential to do so in order that we fully understand how a program has achieved the desired outcome.

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