Sibling power: influence of older siblings' persuasive appeals on younger siblings' judgments about risk taking behaviours

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Abstract

Objectives—Although many injuries happen when school age children are away from home and in the company of other children, we know surprisingly little about interpersonal influences on children's risk taking decisions. The aim of the present study was to examine the influence of older siblings' persuasive appeals on young children's decisions about engaging in behaviours that could threaten their physical safety.

Methods—Forty same sex sibling pairs participated. Children were shown drawings of play scenes (bicycling, river crossing, and sledding), with each depicting lower and higher risk paths of travel. Children of 8 years made initial decisions as to which paths they would take. Subsequently, their older sibling acted as a confederate and tried to persuade them to change their decisions.

Results—After the appeals of older siblings, younger children significantly shifted their decisions: choices of less risky paths replaced the initial selection of more risky paths, and vice versa. A positive sibling relationship was predictive of younger siblings' decision changes. Boys and girls were equally effective in persuasion but they did so using different types of arguments, with boys communicating primarily appeals to fun and girls emphasizing appeals to safety.

Conclusions—These findings highlight the effect that older siblings can have on risk taking decisions of younger siblings. Accordingly, they document the importance of considering the interpersonal context of risk taking when designing interventions to reduce injuries among elementary schoolchildren.

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In most industrialized countries unintentional injuries rank as the number one cause of death for children 1 to 14 years of age.^{1–3} For infants and preschoolers, close supervision of activities is necessary and many injuries result from lack of knowledge, negligence, and poor judgment on the part of their caregivers. School age children, however, are increasingly left to decide on their own activities, and to judge

for themselves whether or not to engage in behaviours that could threaten their physical safety. Not surprisingly, therefore, many injuries among school age children happen when they are with other children. Indeed, some have suggested that school age children are at greatest risk of injury when in the company of other children.^{3,4} Surprisingly, very little is known about interpersonal influences on school age children's decisions to engage in or avoid injury risk behaviours. Toward this aim, the present study examines the extent to which the persuasive appeals of older siblings influence younger children's decisions about engaging in behaviours that could lead to injury.

The powerful effect of peer and family influences on adolescent's adoption of health risk behaviours (for example, smoking, drug use) is well documented.^{5,6} For younger children, however, much less is known about how significant others influence such decisions. A number of studies on the effects of persuasive appeals in non-risk contexts indicate that interpersonal influences on decision making operate at very young ages,^{7–9} with children's persuasive strategies well developed by 8 years of age.¹⁰ Furthermore, the effectiveness of persuasive appeals by elementary schoolchildren depends, in part, on the relationship shared by the persuader and the recipient child.¹¹ For example, appeals to friends are more likely to result in compliance than are appeals to acquaintances.⁸

In the present study we examined how effectively children persuade other children to alter their decisions regarding behaviours that could threaten their physical safety. Because siblings have a significant influence on one another's lives, with strong emotional attachment,¹² we elected to have an older sibling act as the confederate and attempt to persuade their younger sibling to do something other than what the younger child had originally planned (that is to take or avoid an injury risk situation). Furthermore, because widely spaced siblings do not have as much conflict in their relationships as closely spaced siblings,¹³ we selected sibling pairs that were three to four years apart in age. We limited our sample to same sex siblings because they tend to share more companionship than mixed sex pairs^{14,15} and to identify more with one another.¹² All of these are attributes we deemed important to promote consideration by the target child of the persuasive appeals offered by the confederate.¹⁶

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Methods

SUBJECTS

The sample was recruited through the schools and comprised 40 families, including 19 having female children and 21 having male children. One of the 19 families with girls comprised twins, resulting in 20 younger girls providing data and 19 older siblings. Of the 21 families with boys, one younger boy did not complete testing.

Nearly all of the older siblings were first born and there were no siblings between the participating children. The mean (SD) ages of the younger and older children were 8.1 (0.6) years and 11.3 (0.6) years, respectively. None of the children had ever experienced an injury requiring medical care while performing the play activities included in this study. There were no age or sex differences in the number of injuries reported by parents as occurring during the past year and requiring treatment by parent (mean 8.5) or by a physician (mean 0.5).

DESIGN

To examine the persuasion process we selected three activities that were common among children in our community: bicycling, outdoor play near water, and sledding. We then developed three scenes, one involving each of these activities, that allowed for natural variations in risk to be incorporated into each scene. In each there were low and high risk paths that could be taken. Younger children initially indicated which path they would take in each scene. Following the persuasive appeals of their older sibling, they made a final decision as to which path they would follow. To examine the possibility that other factors might influence path decisions, children also assigned ratings to indicate how much risk to their safety each path posed (that is a *danger* rating), noted which risk factors were present in each scene,

and indicated which paths they believed their mother and father would like them to take. Older and younger children also independently completed questionnaires to assess dimensions of their relationship with one another and determine if the nature of the relationship affected the success of the sibling's efforts at persuasion.

STIMULUS MATERIALS

The stimuli comprised three black and white line drawings, which were extremely rich in detail.¹⁷ An example is provided in the figure (copies are available from the first author). The stimuli were copied onto 8 × 10 inch card stock paper, and then laminated. There was one drawing for each of the three types of activities: bicycling through the neighbourhood to a friend's house, walking to a tree house on the other side of a stream, and sledding down a steep hill. Each drawing depicted low and high risk paths that could be taken to get from where the child was in the drawing to where the child wished to go, as specified by a story told to the children. For example, for the stream crossing depicted in the figure, the bridge was designated the low risk path and the log the high risk path. The other two drawings incorporated three levels of risk (low, moderate, and high risk paths).

We also made a 'danger meter' for the children to indicate how much risk of injury there was for each path in each scenario. This fabric covered cardboard (20 × 20 cm) took the form of a thermometer with a zipper-type mechanism that allowed the child to slide a ribbon, similar to the mercury in a thermometer, to indicate his or her rating of risk. A seven point scale was used, with 1 corresponding to 'safe' (that is the ball end of the meter) and 7 corresponding to 'very dangerous' (that is the top end), with equidistant points along the meter.

MEASURES

The Children's Injury History Questionnaire provided demographic information on injury experiences, with an 'injury' defined as any event (for example a cut, bump, or bruise) that made the child cry or complain of pain. This five minute questionnaire provided an index of how many and what type of injuries the children had sustained during the past year, and whether medical or home treatment was required, as reported by the primary caregiver (see Subjects section for data summary).

To assess the sibling relationship, younger and older siblings independently completed the Sibling Inventory of Behaviour-Revised (SIB-R,¹⁸) and the Sibling Relationship Questionnaire-Revised (SRQ-R,¹⁴). The SIB-R is a 34 item questionnaire that provides a standardized measure of how often children direct specific positive and negative behaviours towards their sibling; interitem reliabilities range from 0.64 to 0.89.¹⁸ Young children listened to a statement (for example 'Gets angry with you'), and then rated how often their sibling

Drawing showing child (arrowed) walking to tree house on other side of stream.

behaved that way towards them using a five point scale that ranged from 'never' (score of 1) to 'always' (score of 5), with 'sometimes' as the midpoint. Older children read the items themselves.

The SRQ-R is a 38 item questionnaire that taps 12 dimensions of the sibling relationship and can be collapsed to yield an index both of positive and negative behaviours between the siblings. The ratings obtained by the SRQ-R relate to sibling interactions in a wide range of social contexts,¹⁵ providing support for the ecological validity of the measure. Younger children listened to each question (for example, 'How much does [name of sibling] tell you what to do?') and then chose a response from five alternatives ranging from 'hardly at all' (score of 1) to 'very very much' (score of 5), with 'somewhat' as the midpoint. Older children read the items themselves.

PROCEDURES

All test sessions were audiotaped in the homes of the participants during a two hour visit. The parent completed an Injury History Questionnaire for both the younger and older child, and answered a few questions about demographic information.

Initially, each child worked independently with different experimenters. The older child selected the paths he or she would take for each scenario, then provided a danger rating of all paths, discussed perceived risk factors for each path, and indicated which path they thought their mother and father would like them to take.

The younger sibling was presented with the scenarios in the same order as that of the older sibling, with the order randomized across sibling pairs. While the younger sibling made their path decision for the first scenario, the older sibling was instructed on their role as a confederate to persuade the younger child to alter his or her decision using whatever appeals they felt would be effective.

After the younger child made their path choice, the older sibling assumed their role as a confederate and entered the room under the pretence of waiting for the experimenter to help them with a task and he or she was secretly told which path the younger sibling had selected. The experimenter explained what the younger child was doing and the older sibling then offered to the child his or her opinion on what path should be taken, and why. The older child attempted to persuade the younger child to alter their decision without indicating knowledge of the child's original decision or familiarity with the stimulus materials. The experimenter did not participate in this discussion between the children. Following the persuasion efforts, the older sibling left the room with the experimenter and another experimenter entered. The younger child was then asked by the new experimenter to make their final decision as to which path they would take. The new experimenter continued on to obtain an initial path decision for the second scenario.

The process of alternating experimenters, with persuasion efforts by the older sibling interspersed, continued until final path decisions for all scenarios had been obtained. This allowed children to alter their path decisions without knowledge of this by their older sibling or the experimenters. This was important to avoid eliciting any concerns by younger siblings about what others would think if they altered their decisions, since the latter might result in resistance to change their decisions. Following completion of the path selection phase, younger children were asked to assign a danger rating for each path, note risk factors on each path, and to indicate which path their mother and father would want them to take.

The SRQ-R and SIB-R questionnaires were completed independently by each sibling after finishing the persuasion session. At the conclusion, all children were debriefed and given small gifts. During debriefing, none of the children expressed any awareness of a pattern regarding which paths the older sibling was encouraging them to take. In fact, most younger children expressed surprise when the role of their older sibling as a confederate was explained.

DATA REDUCTION

Initially, audiotapes were transcribed verbatim. To examine if number of risk factors identified varied systematically with age and/or sex, we first made a list of which factors were reliably mentioned by at least 20% of the children and less frequently mentioned factors were excluded from analyses. Next, we computed a proportion score for each individual for each path: the number of risk factors identified for a path was divided by the total number mentioned across all children for that path. These proportion scores were then statistically analyzed.

Each child was assigned a score depending on which path was selected for each scenario, and scores were then analyzed to assess for age and/or sex differences.

To examine the persuasion process, two raters independently identified discrete persuasive appeals, achieving 94% agreement (κ statistic), with remaining disagreements resolved by discussion. Subsequently, we categorized the type of persuasive appeal made by older siblings into one of four categories derived from the data: (1) *safety based* arguments (for example 'There are fewer cars to worry about that way'), (2) *convenience based* arguments (for example, 'That way is faster'), (3) *fun based* arguments (for example 'That way is more exciting'), and (4) *other*. A second scorer categorized 25% of the persuasive appeals, yielding a reliability estimate of 97% (κ statistic). The categorizations of the primary coder were analyzed.

For the SIB-R and the SRQ-R we computed a ratio score to reflect the balance of positive to negative attributes in the sibling relationship, with a score above 1.0 indicating a predominantly positive relationship and a score below

1.0 indicated more negative than positive attributes. Because a Pearson correlation between these two ratio scores revealed a high degree of redundancy ($r=0.89$, $p<0.0001$), we averaged the ratio scores for each subject, thereby obtaining one score that reflected the balance of positive to negative characteristics in the sibling relationship. These data were then related to number of path decision changes.

Results

CHILDREN'S PATH DECISIONS

Before persuasive appeals

Table 1 shows the initial path decisions of the children as a function of scenario, sex, and age group. As can be seen, for the bicycling scenario, at both ages, females were more inclined than males to select the moderate risk path, whereas males more often than females chose the high risk path ($p<0.05$). For the sledding and river crossing scenarios, the same trend for males to select the higher risk path more often than females was evident for younger children for the sledding and river crossing scenario, and for the older children for the river crossing scenario. Similarly, when collapsed over the three scenarios and two ages, males selected the higher risk path more often than females ($\chi^2=3.80$, $p<0.05$). Thus, consistent with the higher incidence of injuries among boys in the literature, boys were more likely than girls to select routes that posed a greater threat of injury.

All children were asked to predict which paths in each scenario their mothers and fathers would prefer them to take. Many children (68%) selected paths they felt their parents would allow them to travel on, but 80% of those who selected 'high risk' paths indicated an awareness that their parents would not want them to do so. When the children explained this discrepancy, they typically (82%) said that the parent did not know how good they were at the activity depicted; in other words, the children often provided a competency based rationale for their selection of the 'high risk' path. Interestingly, when there were discrepancies between what the children believed their mother and father would allow them to do (37%), fathers were nearly always (91%) perceived as willing to allow the child to take a higher risk path than would the mother.

After persuasive appeals

Table 2 shows the per cent of decision changes from low to higher risk, and vice versa, by

younger siblings. Of the 40 younger children, 22 (55%) changed their decisions for at least one scenario. These 22 children made a total of 35 decision changes across the three scenarios (48% change rate), and there were no significant differences in the number of decision changes.

As can be seen in table 2, collapsing over scenarios, following the persuasive appeals of their older siblings, younger children significantly altered their decisions from higher to lower risk paths ($t(31)=4.31$, $p<0.001$), and from higher to lower risk ones ($t(31)=7.19$, $p<0.005$). Comparing the rates of decision changes from lower to higher risk, and vice versa, within each scenario, revealed comparable significant results ($p<0.05$).

Sibling relationship and decision changes

To examine if the nature of the sibling relationship was related to the likelihood of the younger children altering their path decisions, a one tailed bivariate regression analysis was conducted using sibling relationship scores to predict number of decision changes. Results revealed that younger children's positive perceptions of their relationship with their older sibling predicted decision changes regardless of the direction of shift ($r=0.34$, $p<0.05$). Thus children were more susceptible to influence when the relationship they shared with the persuader was predominantly positive (that is, acceptance, kindness, prosocial, nurturance, affection, companionship, intimacy, admiration, similarity) as opposed to negative (that is, dominance, quarrelling, competition, aggression, hostility, avoidance).

Types and number of persuasive appeals

To examine whether there were differences in the type of persuasive appeals expressed by boys and girls for the different scenarios a multivariate analysis of variance was conducted with sex (2), scenario (3), and type of persuasive appeal (4) as factors. As is seen in table 3, the type of argument expressed varied depending on sex ($F(3, 114)=3.32$, $p<0.05$). A Newman-Keuls analysis revealed that boys made significantly fewer appeals to safety and significantly more appeals to fun-related outcomes in comparison to girls ($p<0.05$). Although one might expect that the type of persuasive argument would vary with the context, the incidence and type of appeal did not vary across scenario ($p>0.05$).

Finally, a Pearson correlation between the

Table 1 Percentage of boys and girls in each age group (young, old) that initially chose each path (low, medium, high risk) in each scenario

Group/ sex	Bicycling			Sledding			River crossing	
	Low	Medium	High	Low	Medium	High	Low	High
Young								
Girls (n=20)	15	75	10	55	30	15	75	25
Boys (n=20)	25	30	45	75	0	25	60	40
Old								
Girls (n=19)	11	84	5	32	32	36	74	26
Boys (n=21)	19	52	29	52	19	29	67	33

Table 2 Percentage of decision changes (number of each indicated within parentheses) for each scenario by sex. Decisions could change from lower to higher risk paths (designated by a '+'), or from higher to lower risk paths (designated by a '-')

Sex	Bicycling		Sledding		River crossing		Total	
	+	-	+	-	+	-	+	-
Girls	100 (1)	0	80 (5)	20	71 (7)	29	84 (13)	16
Boys	50 (6)	50	38 (8)	62	62 (8)	38	68 (22)	32

Table 3 Proportion of persuasive appeals of each type that older boys and girls made to their same sex younger siblings

Sex	Type of persuasive appeal			
	Safety	Convenience	Fun	Other
Girls	0.53	0.25	0.22	0.00
Boys	0.20	0.24	0.48	0.08

number of decision changes (0–3) and total number of arguments revealed that the more arguments that were made the more likely children were to change their decisions ($r=0.59$, $p<0.001$). Thus, it was not just *what* was said but the *number* of arguments made that influenced the effectiveness of persuasive appeals by children.

RISK PERCEPTION

Identifying dangers

Children were asked to identify things that could be dangerous for them on each of the paths in the three situations. An analysis of variance indicated no age or sex differences in the number of dangers mentioned ($p>0.05$). Children were careful observers and mentioned not only the more obvious hazards that posed the greatest risks, but a number of other less significant hazards as well, averaging two to four dangers per path.

Danger ratings of paths

Children also assigned danger rating scores (range: 0–7) to each path. An analysis of variance with age (2), sex (2), scenario (3), and path (2) as factors revealed that children’s ratings of danger for the different paths varied for the low and high risk routes ($F(1, 474)=628.14$, $p<0.001$). Paired comparison tests confirmed, as shown in table 4, that children assigned significantly different danger ratings for paths within each scenario and these ratings followed the expected ordering of paths with respect to degree of injury risk ($p<0.01$).

It is noteworthy, however, that the number of dangers children mentioned did not correlate significantly ($p>0.05$) with their danger ratings for each path. It was not the number of hazards *per se* that influenced the danger ratings, but the nature of *what* the hazards were. Even for the highest risk paths children often mentioned only one to three hazards, although their danger ratings indicate that they weighted these hazards as posing more of an injury threat than the hazards they identified for the lower risk paths.

Danger ratings and path decisions

Pearson correlations were conducted to determine if the danger ratings related to path decisions. For older children, there was only one relationship that was significant, suggesting that older children were influenced by factors other than risk ratings in making their path decisions. By contrast, younger children’s path decisions related systematically to their risk ratings. For each of the scenarios, the

Table 4 Average danger ratings (possible range: 0–7) children assigned for each path in each scenario

Bicycling		Sledding		River crossing	
Junkyard	Street	Rocky	Smooth	Log	Bridge
5.0	2.0	5.6	2.0	5.1	1.9

higher the danger rating assigned a path the less likely younger children were to chose that path ($r=-0.37$, -0.58 , and -0.32 , respectively, for the high risk paths, $p<0.001$).

Discussion

In this study, boys generally selected a high risk path more often than girls. Increased risk taking by males is consistent with injury statistics: boys have two to four times more injuries than girls. Although the parents of boys in our sample did not report higher injury rates, this probably reflects inaccurate measurement of these rates by having *parents* provide this information on behalf of their 8 and 11 year old children. Children in this age range sometimes report injuries of which parents are not aware.^{19 20} For elementary schoolchildren, therefore, parents may not be as well informed as the children are when it comes to reporting on injuries, particularly minor ones.

Elementary school age children were susceptible to the influence of older children’s persuasive appeals for risk taking. Not surprisingly, a positive relationship between the two resulted in children being more vulnerable to persuasion.^{11 21} Extending these results to peer relationships, it is likely that children will more readily be influenced to follow the lead of best friends rather than acquaintances or friends with whom they do not share a predominantly positive relationship.⁸ The finding that boys and girls expressed *different* types of arguments (predominantly safety based by girls and fun appeals by boys), though they shared the *same* goals, suggests that interventions aimed at inoculating or training children to resist peer pressures for risk taking,²² may have to differ in content for boys and girls in order to be effective.

The finding that the number of persuasive appeals influenced children’s making a decision change indicates that *what* is said, as well as *how many* arguments are made, both influence elementary schoolchildren being persuaded to alter a decision about risk taking. In this study we focus exclusively on what the older sibling said to the target child. However, these dyads typically became involved in discussion, exchanging information about the pros and cons of each path. Possibly, in this context, which allowed participants to engage in dialogue about the risk taking situation, the number of arguments has a cumulatively greater influence. Related to this, although we studied persuasion as though it were a uni-directional process (older sibling influencing younger child), we do not assume this to be the

case. In fact, we think it more parsimonious to think of persuasion as a bidirectional process because dyads who share a meaningful relationship are likely to reciprocally exchange information in attempting to bring their own opinion to bear and to influence decision making. A study in progress in which we are examining the process of persuasion within best friend dyads, and are attempting to code the exchanges so as to capture more about the process that leads to successful persuasion outcomes, should provide further insights into this issue.

Not surprisingly, younger children's risk taking decisions related to their danger ratings for the different paths. The more a path was rated as dangerous the less children selected it for travel. At older ages, however, there was no statistical relationship between risk taking decisions and danger ratings, suggesting that other factors influenced older children's risk taking decisions. Obviously, research on what factors influence children's risk taking decisions at different ages is needed. For adults, decisions about risk taking are influenced by several factors such as: perceived personal vulnerability or susceptibility to that danger, beliefs about the incidence or prevalence of injury, and a weighting of the costs (for example, injury) to potential gains (for example, faster) of engaging in the risk taking activity.²³ Perhaps, with increasing age, children also come to consider these factors, resulting in risk taking becoming increasingly multidetermined with increasing age.

Several of our findings suggest other interesting questions to pursue in future research. For example, children consistently reported a belief that their father would tolerate their engaging in more risk taking than their mother. Relatively little is known, however, about the role, if any, parents have in promoting risk taking in their children, or if mothers and fathers differ in their tolerance for risk taking. A second question that merits further study emerges from our finding that children who selected paths higher in risk than they expected their parents to tolerate often explained their decision by alluding to a competency level that they felt was greater than that for which their parent gave them credit. This result suggests that children are aware of injury risks, which is consistent with their differential risk ratings for the paths (see table 4), but that they provide for themselves rational and valid reasons to support their risk taking decisions. To the extent then that children have unrealistic expectations of their abilities, they may be especially likely to place themselves at risk for making poor decisions that lead to increased injury risk.

Extending this reasoning, if males are more likely than females to overestimate their abilities, this also could explain greater risk taking by males than females leading to their greater injury rates.

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