Mothers’ Home-Safety Practices for Preventing Six Types of Childhood Injuries: What Do They Do, and Why?

Barbara A. Morrongiello, PhD, and Sophie Kiriakou, BA

University of Guelph

Objective  To identify determinants of mothers’ home-safety practices for preventing six types of common injuries to children (burns, poisoning, drowning, cuts, strangulation/suffocation/choking, and falls).  Methods  Home interviews were conducted with mothers of children 19–24 and 25–30 months old about home-safety practices. For each of 30 safety precautions to prevent these six types of injuries, mothers indicated whether or not they engaged in the practice, and explained why.  Results  Regression analyses revealed both common and unique determinants of mothers’ home-safety practices to prevent these six types of home injuries. For burns, cuts, and falls, beliefs that child characteristics and parent characteristics elevated the child’s risk of injury were the key determinants of the mother’s engaging in precautionary measures. For drowning, poisoning, and suffocation/strangulation/choking, health beliefs also contributed to predict mothers’ practices, including beliefs about potential injury severity and extent of effort required to implement precautionary measures.  Conclusions  The factors that motivated mothers to engage in precautionary measures at home varied depending on the type of injury. Intervention programs to enhance maternal home-safety practices will need to target different factors depending on the type of injury to be addressed.

Key words  home safety; children; parent practices.

Unintentional injuries pose a significant health threat to children. Each year at least 600,000 children in the United States are hospitalized, 16 million are treated in emergency rooms, and more than 30,000 are permanently disabled due to injury (CDC, 2000; Rodriguez, 1990). Moreover, in many industrialized nations, including the United States and Canada, injuries are the leading cause of death in children older than 2 years (Canadian Institute of Child Health, 1994; Wilson, Baker, Teret, Shockey, & Garbarino, 1991). Over 4 million preschool-aged children are injured annually, mostly due to falls, poisonings, and burns (Baker, O’Neill, & Karpf, 1984; Rice & MacKenzie, 1989), with the greatest risk of injury occurring in their homes (Rivara, 1995; Shanon, Bashaw, Lewis, & Feldman, 1992).

Parents are often very knowledgeable about injury risks in the home (Morrongiello & Dayler, 1996). However, they are unaware of the scope of the child injury problem (Eichelberger, Gotschall, Feely, Harstad, & Bowman, 1990) and do not routinely think about injury risk in the course of their day-to-day interactions with their child (Morrongiello & Dayler, 1996). Findings also indicate that parents do not hold a strong belief in the preventability of injuries, though they believe that they can somehow keep their child safe (Eichelberger et al., 1990; Morrongiello & Dayler, 1996). They are aware that a child’s risk of injury depends on many factors, including the child’s developmental level, caregivers’ behavioral choices, and the degree of supervision provided (Fagot, Kronsberg, & MacGregor, 1985; Garling & Garling, 1993a, 1993b, 1995; Peterson,
Ewigman, & Kivlahan, 1993; Wortel, de Geus, Kok, & van Woerkum, 1994). However, this knowledge does not influence how closely they supervise children at high risk for injury (Glik, Kronenfeld, & Jackson, 1991, 1993; Rosen & Peterson, 1990).

Research has focused primarily on identifying what parents’ home-safety practices are (Halperin, Bass, & Mehta, 1983; Santer & Stocking, 1991) or on which demographic factors relate to practices and safety-device usage (Gielen, Wilson, Faden, Wissow, & Harvilchuck, 1993; Mock et al., 2002; Mott, 1999; Ueland & Kraft, 1996) or nonusage (Greaves, Glik, Kronenfeld, & Jackson, 1994). There has been surprisingly little research to identify factors that motivate parents’ decisions to engage in safety practices known to reduce child injury risk in the home, though this knowledge is essential for advancements in injury prevention.

Efforts to prevent injuries to young children have focused primarily on caregivers and home environments (NCIPC, 1989). The primary goal has been to increase parents’ safety practices, by promoting their implementation of passive, or environmental, modifications to their homes and/or evoking more active, or parent-based, safety-promotion behaviors (for discussion of these two approaches, see Finney et al., 1993). Most interventions, however, have achieved limited success. For example, Woolf, Lewander, Filippone, and Lovejoy (1987) found that an education program carried out in an emergency clinic had only short-term impact on having syrup of ipecac and a poison control number in the home. Kelly, Sein, and McCarthy (1987) conducted a trial of a clinic-based multisession counseling intervention for parents and found no differences between the intervention and control groups in number of safety-hazard precautions (e.g., electrical outlet covers, storage of dangerous substances) observed in the home. Even providing safety devices for free has not necessarily resulted in their increased usage by parents (Dershewitz & Williamson, 1977; Gallagher, Hunter, & Guyer, 1985). Moreover, interventions sometimes are successful to increase knowledge but still do not yield differences in home hazard rates between intervention and control groups postintervention (Paul, Sanson-Fisher, Redman, & Carter, 1994). Hence, it is apparent that motivating parents to change their behavior and engage in more safety practices is difficult to achieve. One significant barrier to developing successful programs may be our limited understanding of the bases for their safety decisions, including whether factors that motivate these decisions vary as a function of type of injury.

A variety of psychological constructs and theories have been developed to explain how attitudes relate to an individual’s decisions about health behaviors. The Health Belief Model (Rosenstock, Strecher, & Becker, 1988) is a conceptual model widely used in studies of health-related behavior. According to this model, decisions about health behaviors derive from risk perceptions (vulnerability, severity) and evaluation of costs (e.g., effort) and benefits (e.g., preventability one can attain). There has been considerable support found for this model (Janz & Becker, 1984). The Theory of Reasoned Action (Ajzen & Fishbein, 1980) goes beyond these constructs to emphasize the important role that social norms play in shaping an individual’s attitudes and behaviors. Support for the importance of this construct also has been found, for example, with respect to smoking (deVries, Dijkstra, & Kuhlman, 1988) and contraception use (Condellie, 1986).

In the present study we incorporated measures of each of these constructs (vulnerability, severity, effort, preventability, and social norms) in an effort to identify those that best predicted mothers’ home-safety practices. Drawing on the epidemiological literature, we focused on injuries known to be likely to occur to young children in their homes, including falls, poisoning, drowning, cuts, burns, and suffocation/strangulation/choking (these three were collapsed into one category because their prevention behaviors overlap to a great degree). We treated each injury separately in our analyses, instead of collapsing over injury type as is usually done in this research area, so that determinants of injury-specific safety behaviors could be obtained. Home interviews were conducted with mothers of children aged 19 to 24 and 25 to 30 months. Two age ranges were included to explore whether mothers’ safety practices, or their underlying motivations, varied as a function of their child’s developmental level (e.g., Greaves et al., 1994). During home interviews, mothers explained why they did and did not engage in four or five common safety practices for each of the six types of injury; these data were then used to identify determinants of mothers’ safety practices for each type of injury separately.

Method Participants

The sample comprised 59 mothers of female (n = 30) and male (n = 29) toddlers aged 19–24 months (M = 22.36, SD = 1.52), and 62 mothers of females (n = 31) and males (n = 31) aged 25–30 months (M = 27.85,
Mothers were married and living with their spouse; none were employed outside of the home. Participants were randomly selected from an existing database of families who had indicated a wish to participate in research on child development. Annual family income distribution for the sample was as follows: 10% earned less than $40,000; 26% earned between $40,000 and $59,999; 35% earned between $60,000 and $79,999; and the remainder earned over $80,000. Eight percent of the mothers had completed high school, 78% had some or completed college education, and the remainder had some graduate education. Nearly all mothers were white. None of the immediate family members had ever been hospitalized for an injury.

**Measures**

**Questionnaires**

Participants completed (1) a demographic questionnaire to assess parents’ education and family income, and (2) the Beliefs About In-Home Injuries questionnaire, which was developed for this study and tapped a variety of aspects of mothers' beliefs about each type of injury. For purposes of this study, we focused only on mothers' perceptions of young children's vulnerability for each type of injury at home, with scores ranging between 1 and 5 and higher numbers indicating greater perceived vulnerability.

**Interview**

Using a structured-interview format, interviewers obtained information on mothers' home-safety practices for each type of injury. Specifically, mothers were asked to comment on 30 preventive measures, including 4 or 5 per injury type. As can be seen in Table I, these precautionary measures tapped passive, or environmental, modifications (i.e., use of safety devices, such as electrical-outlet protection and stair gates) and active, or parent-behavior, safety initiatives (e.g., use of safety straps in the high chair, not allowing child on the countertop). For each item, participants were asked if they practiced that particular injury prevention measure. Based on the participant’s response, an appropriate set of follow-up questions was then asked.

If a participant engaged in a particular precaution, she was asked to explain what motivated her to do so. She was then asked to rate her beliefs, on a Likert scale of 1 to 5, about the particular injury with regard to that precaution item for each of the following: perceived severity of the potential injury if this precaution were not taken (1 = not serious at all to 5 = very serious); perceived effort to implement the preventive measure (1 = hardly any to 5 = a great deal); perceived benefit of doing so, that is, preventability of the injury (1 = not preventable to 5 = very preventable); and social norm influences or how much others whose opinion she valued would care about her taking this precautionary measure (1 = do not care at all to 5 = care a great deal). These follow-up questions were asked with specific reference to each injury prevention item that participants endorsed. Scores were then averaged to obtain a single estimate for each type of injury separately for later entry into the regression analyses to identify determinants of mothers’ practices.

If a participant did not engage in a particular injury precaution, then she was asked to explain why she did not feel the need to do so. She then chose the single most appropriate reason, from a list of 10 provided (see the footnote to Table V, below, for a listing of these).

**Procedure**

Researchers conducted interviews with mothers in their homes. It was explained that it was understood that all mothers took different precautions to keep their child safe. Furthermore, the researcher did not expect any parent to take every precaution covered in the study. Participants were told that the goal of the study was to find out what were and were not safety issues for their particular child in their particular home environment and to understand the factors that motivated their decisions with respect to safety practices. This explanation was made in an attempt to reduce the demand characteristics of the study by reducing perceived social desirability.

Mothers were asked about each of the 30 prevention items, with the order of presentation of injury type randomized and items presented in random order within each injury category. Each item was presented to participants on a typed card, as well as read aloud by the interviewer. Participants were then led through the appropriate line of follow-up questions based on whether or not they practiced the prevention item. Interviews were tape-recorded and transcribed.

For those precautions that mothers endorsed, the researchers conducted a reliability check to confirm this when possible. Some items were observable (e.g., electrical-outlet covers). For other precautions, the researcher gently queried the mother for more information (i.e., Can you show me where you store your cleaners out of your child’s reach?) or asked for something that would confirm the accuracy of the mother’s reporting (e.g., the researcher might ask for a plastic bag in which to carry some materials, in order to
ascertain availability of plastic bags in the home or where plastic bags are kept; or the researcher might ask to throw something out in the garbage/trash, to ascertain the placement of refuse receptacles).

**Data Reduction**

Open-ended responses by mothers, when they endorsed a precautionary measure, were transcribed. Content analysis and grouping of similar responses resulted in five categories: (1) *child characteristics* (e.g., “He is very active, so I never let him sit on my lap while I am drinking anything hot”), (2) *environmental characteristics* (“The tub is so slippery because we don’t have a mat in it, so I never let him get in or out by himself”), (3) *parent characteristics* (“I can’t be there every time he turns the tap on in the bathroom to wash his hands, so

### Table I. Precaution Measures Asked About for Each Type of Injury. Proportion of the Total Sample of Mothers (N = 121) Who Said They Engaged in the Measure

<table>
<thead>
<tr>
<th>Injury</th>
<th>Precaution Item: “Do you...”</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burn</td>
<td>1. have safety plugs on most, if not all, visible electrical outlets?</td>
<td>65</td>
</tr>
<tr>
<td></td>
<td>2. have your hot water temperature reduced to 125°F or less?</td>
<td>47</td>
</tr>
<tr>
<td></td>
<td>3. make it a point to avoid drinking hot beverages with your child sitting on your lap (e.g., drinking a cup of coffee while reading the child a story) or carrying hot liquids (e.g., a cup of tea) while carrying your child?</td>
<td>65</td>
</tr>
<tr>
<td></td>
<td>4. make it a point to avoid carrying hot food (e.g., a pot you are moving from the stove to the sink or hot cup of coffee) when your child is nearby?</td>
<td>79</td>
</tr>
<tr>
<td></td>
<td>5. make it a point to turn the handles of pots to the back of the stove when cooking on the front burners or avoid cooking on the front burners when your child is around?</td>
<td>97</td>
</tr>
<tr>
<td>Cut</td>
<td>1. make it a point to keep sharp objects (safety pins, knives, and scissors) out of reach of your child?</td>
<td>84</td>
</tr>
<tr>
<td></td>
<td>2. make it a point to not leave your child alone at all in a room where there are decorative objects, vases, or table lamps that could break?</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>3. make it a point to avoid having your child carry breakable objects (e.g., dishes or glasses to the sink)?</td>
<td>74</td>
</tr>
<tr>
<td></td>
<td>4. make it a point to have your recycling bin or garbage can out of reach of your child (e.g., so that empty pop cans, lids of cans, glass bottles are out of reach)?</td>
<td>26</td>
</tr>
<tr>
<td>Fall</td>
<td>1. make it a point to use the safety strap when the child is sitting in the high chair or booster seat?</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>2. have safety gates on the stairs?</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>3. make it a point to not leave your child alone at all on a tabletop or change table (e.g., while you run to the next room to get a diaper or T-shirt)?</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>4. make it a point to not have your child sit on the countertop, even if she/he is helping you cook, bake, etc.?</td>
<td>54</td>
</tr>
<tr>
<td></td>
<td>5. make it a point to not have anything around that the child could climb on and possibly fall off of (e.g., coffee table) or that could fall on the child (e.g., unsecured bookcase)?</td>
<td>21</td>
</tr>
<tr>
<td>Drowning</td>
<td>1. make it a point to empty all water buckets immediately after use?</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>2. make it a point to not leave your child alone when he/she is in the bathtub (e.g., while you run to get a towel from a closet)?</td>
<td>51</td>
</tr>
<tr>
<td></td>
<td>3. make it a point to not leave your child alone at all when near a pool or lake?</td>
<td>94</td>
</tr>
<tr>
<td></td>
<td>4. make it a point to not let your child get in or out of the bathtub by him/herself without you there?</td>
<td>85</td>
</tr>
<tr>
<td></td>
<td>5. make it a point to keep toilet lids closed or the bathroom door closed?</td>
<td>34</td>
</tr>
<tr>
<td>SSC</td>
<td>1. make it a point to not allow your child to walk around while eating something (e.g., a cookie) or carrying his/her bottle or drink?</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>2. make it a point to keep your child away from toys that have small pieces (e.g., Lego, marbles) or small objects that could fit into his/her mouth (nuts, candies)?</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>3. make it a point to keep all plastic bags out of your child’s reach?</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>4. make it a point to keep cords to the window blinds or shades out of your child’s reach?</td>
<td>74</td>
</tr>
<tr>
<td>Poisoning</td>
<td>1. make it a point to store medications out of the child’s reach?</td>
<td>93</td>
</tr>
<tr>
<td></td>
<td>2. make it a point to store cleaners in places that the child cannot reach?</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>3. make it a point to store liquid bleach in a place out of the child’s reach?</td>
<td>83</td>
</tr>
<tr>
<td></td>
<td>4. make it a point to not have any plants around that are poisonous if eaten?</td>
<td>55</td>
</tr>
</tbody>
</table>

SSC = suffocation/strangulation/choking.
a The statement to the parent was, “Do you [precaution item], or is this not really an issue for your child?”
we turned down the hot water temperature”), (4) a belief in common sense, and (5) awareness of social norms about prevention or information communicating a child’s vulnerability for injury (e.g., news stories, ads in magazines).

A similar approach was taken for coding the open-ended responses mothers gave to explain why they did not engage in a particular safety practice. The resulting categories were: child characteristics, environmental characteristics, parent characteristics, and other (e.g., “It’s just not something I ever thought to do or worry about”).

Reliability for this narrative coding was established by having a second coder independently code the data from 20% of the subjects, with kappa estimates exceeding .95 for all categories for both sets of coding. The data of the primary coder were analyzed.

Results
Mothers’ Perceptions of Different Home Injuries
To explore whether mothers’ ratings (range, 1–5) of child-injury vulnerability, severity of injury, effortfulness to prevent injury, preventability, and social norms/pressures for prevention varied by type of injury (falls, burns, poisoning, drowning, cuts, and suffocation/strangulation/choking), an analysis of variance (ANOVA) was conducted with age (2) and sex (2) as between-subject factors and injury type (6) as a within-subject factor, with separate ANOVAs conducted on each rating. These ratings for each type of injury are presented in Table II; it should be noted that Bonferroni corrections were applied for paired comparisons within each injury category.

Ratings of Perceived Vulnerability varied only as a function of injury type, F(5, 582) = 33.34, p < .05. Fall injuries were rated as more likely than all other types of injuries (all p < .05, Bonferroni correction), which is consistent with injury statistics. Vulnerability for poisoning fell below that for suffocation/strangulation/choking (p < .05, Bonferroni correction). However, mothers did not judge vulnerability for any injury to be very great (see Table II).

Ratings of Injury Severity also varied only as a function of injury type, F(5, 582) = 41.50, p < .001. As shown in Table II, falls were rated as less severe than all other injuries (all p < .05, Bonferroni correction), and cuts were rated as less severe than burns, poisoning, drowning, suffocation/strangulation/choking (all p < .05, Bonferroni correction). Mothers rated poisoning, drowning, and suffocation/strangulation/choking as most severe, with no difference across these injury types.

Ratings of Effort Required for Prevention did not vary with injury type, with all mothers rating injury prevention as requiring a moderate amount of effort (M = 3.16, SD = 1.07). However, effort varied for sons and daughters, F(1, 588) = 9.34, p < .05, with more effort required for injury prevention for sons than daughters (M = 2.26 and 1.99, SD = 1.07 and 1.07, respectively).

Ratings of Preventability of Injuries varied as a joint function of the child’s age and sex and the type of injury, as indicated by a three-way interaction, F(5, 582) = 2.40, p < .05. Follow-up ANOVAs, however, revealed similar patterns of differences in ratings across injury types but age-related variation in the magnitude of the effects, which was not of interest per se. Hence, the data are collapsed across groups in Table II. The only noteworthy sex difference occurred for falls, with preventability judged to be lower for sons than daughters in both the younger (M = 2.39 and 3.20, SD = 1.10 and 1.19, respectively) and older (M = 3.42 and 3.68, SD = 1.30 and 1.22, respectively) age groups (all p < .05).

Ratings of Social Norms or Pressures to engage in these practices varied only as a function of type of injury, F(5, 570) = 52.62, p < .01. As can be seen in Table II, mothers rated the social-norm pressures to prevent falls as significantly lower than those to prevent all other types of injuries (all p < .05, Bonferroni correction). Hence, mothers believed that society viewed falls by children as normative and that there was not much expectation for parents to prevent these from happening.

Table II. Mothers’ Ratings, from 1 to 5, for Five Injury-Relevant Parameters, Average (SD).

<table>
<thead>
<tr>
<th>Injury</th>
<th>Vulnerability&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Severity&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Effort</th>
<th>Preventability&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Social Norms&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burn</td>
<td>2.36 (.07)</td>
<td>4.04 (.10)</td>
<td>2.04 (1.01)</td>
<td>4.40 (.82)</td>
<td>3.29 (.79)</td>
</tr>
<tr>
<td>Cut</td>
<td>2.49 (.07)</td>
<td>3.60 (.09)</td>
<td>2.07 (1.05)</td>
<td>3.78 (1.17)</td>
<td>2.77 (1.07)</td>
</tr>
<tr>
<td>Fall</td>
<td>3.29 (.06)</td>
<td>2.90 (.10)</td>
<td>2.42 (.98)</td>
<td>2.80 (1.26)</td>
<td>1.84 (1.25)</td>
</tr>
<tr>
<td>Drowning</td>
<td>2.30 (.07)</td>
<td>4.61 (.09)</td>
<td>2.21 (1.26)</td>
<td>4.76 (.65)</td>
<td>3.65 (.63)</td>
</tr>
<tr>
<td>SSC</td>
<td>2.51 (.06)</td>
<td>4.43 (.10)</td>
<td>2.21 (1.02)</td>
<td>4.30 (.74)</td>
<td>3.15 (.77)</td>
</tr>
<tr>
<td>Poisoning</td>
<td>2.19 (.08)</td>
<td>4.48 (.10)</td>
<td>2.00 (1.10)</td>
<td>4.80 (.57)</td>
<td>3.54 (.77)</td>
</tr>
</tbody>
</table>

<sup>a</sup> SSC = suffocation/strangulation/choking.

* There was significant (p < .05) variation in the rating as a function of injury type.
Social-norm pressure to prevent cuts to their child was rated lower than social-norm pressures to prevent more serious injuries, such as burns, poisoning, drowning, and suffocation/strangulation/choking (all \( p < .05 \), Bonferroni correction). Mothers gave comparable ratings of social-norm pressures to engage in prevention practices for burns, poisoning, and drowning, and these were all significantly less than those pressures on parents to prevent suffocation/strangulation/choking (all \( p < .05 \), Bonferroni correction).

**Mothers’ Home-Safety Practices**

In Table I is shown the proportion of mothers who endorsed each item; if an item was not applicable to the home, then the data were removed from computation of the proportion. For each type of injury, there was considerable variability in mothers’ safety practices, and mothers did more to prevent some types of injuries than others (e.g., drowning versus falls).

To assess for effects related to the child’s age or sex and the type of injury, for each participant we computed an average proportion of yes scores (i.e., collapsing over items within each type of injury), indicating the extent to which each participant engaged in safety behaviors intended to reduce risk for that particular type of injury. An ANOVA was conducted on these proportion scores with age (2) and sex (2) as between-subject factors and injury type (6) as a within-subject factor.

Results revealed that the extent to which mothers engaged in safety practices varied depending on the type of injury, \( F(5, 696) = 21.59, p < .001 \). Specifically, Bonferroni comparisons revealed that mothers engaged in a comparably high proportion of safety practices to prevent burns \( (M = .77, SD = .18) \), drowning \( (M = .73, SD = .20) \), and poisoning \( (M = .76, SD = .20) \), and the extent of these practices significantly exceeded (all \( p < .05 \)) those to prevent cuts \( (M = .58, SD = .23) \), falls \( (M = .56, SD = .24) \), and suffocation/strangulation/choking \( (M = .66, SD = .26) \).

The ANOVA results also revealed that the extent of safety practices varied as a joint function of the child’s age and sex, \( F(1, 696) = 4.95, p < .05 \). Follow-up tests indicated that mothers’ safety practices did not vary with age for sons \( (M = .67, SD = .24) \) but that there was a decline in mothers’ use of safety practices as daughters got older, \( F(1, 376) = 19.05, p < .001 \) \( (M = .73 and .63, SD = .22 and .23, for young and old, respectively) \).

Measures were taken to determine whether what mothers reported doing was an accurate reflection of what they actually did. For each participant, we assigned a separate score for each injury type to indicate the number of things she actually did divided by the number of things we had the opportunity to observe. Seventy-five participants provided data to check on the accuracy of their reporting about burn items, 95 for items about cuts, 28 for drowning items, 34 for items about fall prevention, and 118 for poison items. Overall agreement was 98\% \( (SD = 13\%) \), with scores ranging between 90\% and 100\% across the six types of injuries.

**Mothers’ Beliefs About Factors That Elevated Their Child’s Injury Vulnerability**

During the interview, mothers stated reasons why they engaged in particular safety practices. Scores were calculated to reflect the proportion of reasons cited that fell within each of five categories: child characteristics, environmental characteristics, maternal characteristics, common sense, and social norms. For each type of injury, we conducted separate ANOVAs with age (2) and sex (2) as between-subject factors and reasons (5) as a within-subject factor.

For each type of injury, there was significant variation in the extent to which different types of reasons were cited by mothers, as indicated by a main effect of reason in each analysis, \( F(4, 580) = 89.74, 90.12, 28.22, 81.55, 85.69, \) and 20.85 for burns, cuts, falls, drowning, poisoning, and suffocation/strangulation/choking, respectively (all \( p < .001 \)). Generally, the pattern of variation in reason scores was comparable across injury types. The most frequently cited reason for mothers’ engaging in safety precautions was that they believed that child characteristics necessitated these practices \( (M = .38, SD = .24) \). Mothers also often cited environmental characteristics \( (M = .28, SD = .26) \) and, to a lesser degree, parent characteristics \( (M = .18, SD = .21) \). Mention that they were motivated to engage in these precautions as a way to manage their child’s vulnerability for injury because it was common sense or because they felt social-norm pressures to do so occurred infrequently \( (M = .08 and .07, SD = .13 and .14, respectively) \).

**Best Predictors of Mothers’ Home-Safety Practices**

A primary goal of this study was to determine the best predictors of mothers’ engaging in safety practices to prevent injuries to their young child at home. To achieve this goal, hierarchical regressions were conducted using ordinary least squares, with separate analyses conducted on the data from each injury type. As outlined in Tabachnick and Fidell (1989), a variety of preliminary
screening tests were conducted on the data, with no problems detected.

In Step 1, demographic factors (child age and sex) were entered first, to control for these characteristics. Because prior research on determinants of health practices provides some support for inclusion of health beliefs, in Step 2 these ratings were entered, including: beliefs about children's general vulnerability for that type of injury, beliefs about the potential severity of injury if mothers did not take the precautions, beliefs about the effort required to implement the precautions mothers took, beliefs about preventability of injury achieved by taking the precautions, and beliefs about social-norm pressures for parents to take these precautions in order to prevent injury to their child. Finally, in Step 3, we entered what mothers spontaneously reported when asked to explain the factors that elevated their own particular child's injury vulnerability (i.e., scores for child characteristics, environmental characteristics, and parent characteristics) in order to determine whether these factors contributed to predicting mothers' safety practices over and above psychological factors previously identified in the literature and entered in Step 2; note that we limited our focus to child, environmental, and parent characteristics because these were the most frequently cited factors that mothers believed influenced their child's vulnerability for injury (see above). A listing of significant results for each injury type is given in Table III, with descriptive data (means and standard deviations) on the variables entered in the model provided in Table II.

The child's age and sex did not significantly contribute to explain mothers' safety practices for any of the injury types, as indicated by nonsignificant (p > .05) Step 1 contributions to the models. As can be seen in Table III, for burns, cuts, and falls, similar results emerged regarding the best predictors of mothers' practices for injury prevention. For burns, results revealed a significant Step 3, F(3, 85) = 10.20, p < .001, with child characteristics (β = .06, SE = .01; t = 4.59, p < .001) and parent characteristics (β = .04, SE = .02; t = 2.29, p < .05) both contributing to the model and accounting for a unique 24% of the variance. Similarly, for cuts, a significant Step 3, F(3, 85) = 16.69, p < .001, was supported by significant contributions from child characteristics (β = .17, SE = .02; t = 5.54, p < .001) and parent characteristics (β = .09, SE = .03; t = 3.32, p < .001), with these factors accounting for 37% of unique variance. Finally, for falls, a significant Step 3, F(3, 85) = 7.11, p < .001, was supported by significant contributions from child characteristics (β = .08, SE = .02; t = 4.22, p < .001) and parent characteristics (β = .05, SE = .02; t = 2.31, p < .05), and these factors explained 38% of unique variance. Hence, for burns, cuts, and falls, about 30% of the variance in mothers' engaging in specific injury prevention strategies was attributable to child and parent characteristics.

As can be seen in Table III, the predictive model was different for drowning, suffocation/strangulation/choking, and poisoning, with some health beliefs also significantly contributing to influence mothers' preventive practices for these types of injuries. For drowning, there was a significant Step 2, F(5, 88) = 2.44, p < .05, with beliefs about injury severity significantly contributing to this effect (t = −2.53, p < .05) and accounting for 12% of unique variance. The addition of the factors in Step 3 added significantly to the model, F(3, 85) = 12.98, p < .001, accounting for an additional 27% of unique variance, with this effect reflecting the significant contribution of child characteristics (β = .06, SE = .01; t = 4.00, p < .001), environmental characteristics (β = .04, SE = .02; t = 2.12, p < .05), and parent characteristics (β = .06, SE = .02; t = 3.34, p < .001) to predict mothers' practices. Similarly, for suffocation/strangulation/choking, there was a significant Step 2, F(5, 88) = 14.31, p < .001, reflecting the contribution of beliefs about injury severity (β = .06, SE = .03; t = 2.19, p < .05) to predicting mothers' practices for prevention. The addition of the mother's beliefs about factors that increased their child's vulnerability for injury also added significantly to the model in Step 3, F(3, 85) = 11.21, p < .001, with child characteristics (β = .08, SE = .02; t =

<table>
<thead>
<tr>
<th>Injury</th>
<th>Step²</th>
<th>R²</th>
<th>R² Change</th>
<th>F Change²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burn</td>
<td>3</td>
<td>.34</td>
<td>.24</td>
<td>10.20**</td>
</tr>
<tr>
<td>Cut</td>
<td>3</td>
<td>.38</td>
<td>.37</td>
<td>16.69**</td>
</tr>
<tr>
<td>Fall</td>
<td>3</td>
<td>.29</td>
<td>.28</td>
<td>7.11**</td>
</tr>
<tr>
<td>Drowning</td>
<td>2</td>
<td>.13</td>
<td>.12</td>
<td>2.44*</td>
</tr>
<tr>
<td>SSC</td>
<td>2</td>
<td>.11</td>
<td>.07</td>
<td>14.31**</td>
</tr>
<tr>
<td>Poisoning</td>
<td>2</td>
<td>.18</td>
<td>.15</td>
<td>3.23*</td>
</tr>
<tr>
<td>Poisons</td>
<td>3</td>
<td>.50</td>
<td>.32</td>
<td>18.09**</td>
</tr>
</tbody>
</table>

SSC = suffocation/strangulation/choking.
²p < .05; **p < .001.
² Step 2 variables included ratings of vulnerability, severity, effort, preventability, and social norms for that type of injury. Step 3 variables included scores for child, environment, and parent characteristics.
² F ratio reflecting significance of variables entered on that step of the regression equation.
Reasons for Not Engaging in Home-Safety Practices

To understand why mothers chose not to engage in more safety practices at home, we examined the reasons they gave for not doing so. An ANOVA with age (2) and sex (2) as between-subject factors and reasons (5) as a within-subject factor was conducted separately for each injury type.

For each type, results revealed significant variation in reasons as a function of type of injury (all \(p < .05\)), but no effects of age or sex. As can be seen in Table IV, the most frequent reasons mentioned indicated that mothers believed that child characteristics made the precaution unnecessary and that they as mothers possessed characteristics that would allow them to keep their child safe without engaging in these particular practices; for each type of injury, except cuts, these scores significantly exceeded mention that some environmental characteristics made the precaution unnecessary, or responses that were coded as other (Bonferroni contrasts, all \(p < .05\)).

Following their spontaneous reports about why they did not engage in a safety practice, mothers completed a checklist indicating the single best reason. The percentage for each of these 10 reasons appears in Table V, with data presented separately for each type of injury. As can be seen, 3 reasons were most often cited by mothers for not engaging in a specific safety practice: (1) They felt that their child’s vulnerability for injury in that situation was very low because the child could manage the risk without being injured or was not likely to interact with an accessible hazard, (2) they felt that they could ensure their child’s safety by close supervision, and (3) they felt that their child knew basic safety rules and would ensure their child’s safety by close supervision.

Discussion

Although there have been numerous studies on mothers’ safety practices, the present study is unique in several ways. First, in addition to parent self-report, unobtrusive home observations were used in order to check on the accuracy of what mothers reported. Second, safety
practices were examined separately for six different types of injuries, rather than collapsing across injury type or ignoring this variable altogether and just counting hazards in the home. Third, this research identifies key determinants of mothers’ home-safety practices, rather than simply documenting what mothers do and what demographic factors relate to these practices. Fourth, the results provide insights not only into the reasons why mothers decide to follow certain safety practices but also into the reasons why they elect not to engage in certain precautionary measures. The findings have implications for interventions to increase mothers’ home-safety practices. Each of these aspects of the results will be discussed in turn.

**Mothers’ Home-Safety Practices**

Mothers were asked to report on their use of 30 safety practices that addressed injury risk for cuts, burns, falls, drowning, falls, poisoning, and suffocation/strangulation/choking. In contrast to previous studies that have used self-report measures (Gielen et al., 1995; Glik et al., 1993; Mock et al., 2002), we conducted interviews in mothers’ homes, which allowed for unobtrusive checking on the accuracy of at least some aspects of mothers’ reports about home-safety practices. The findings confirmed what mothers reported doing was an accurate reflection of what they actually did for those items on which we could check. Of course, it is impossible to know how accurately mothers reported on safety practices on which we could not check. Nonetheless, the findings provide an accurate picture of what mothers do with regard to at least some home-safety practices.

Ratings of injury vulnerability indicated that mothers assumed that children at these ages were not especially at risk for these types of injuries, which is consistent with previous research (Eichelberger et al., 1990). Examining the proportion of mothers in our sample who endorsed the various safety precautions revealed considerable variability in mothers’ safety practices. It was not the case that for any one type of injury mothers did everything possible to prevent injuries to their child. Rather, mothers were selective about what they did to prevent any particular type of injury. There were surprisingly few precautions practiced by most mothers, and mothers did more to prevent some types of injuries than others. For example, mothers engaged in more safety practices to prevent burns, drowning, or poisoning than to prevent falls, even though children’s vulnerability for falls was rated higher than that for all other types of injuries. A belief that some falls are normative and just part of childhood (Morrongiello & Dayler, 1996) or that fall injuries are unlikely to be severe may contribute to explain such differences in practices.

Interestingly, mothers’ safety practices did not vary with age for sons, but did decline with age for daughters. This difference may relate to the fact that by 2 or 3 years of age, boys typically engage in greater risk taking than girls (Ginsburg & Miller, 1982; Morrongiello & Dawber, 1998; Morrongiello & Rennie, 1998) and they start to experience more injuries (Baker et al., 1984; Canadian Institute of Child Health, 1994), which communicates to parents a clear need for precautionary measures to continue to be taken for sons. Consistent with this interpretation, mothers judged that more effort was required to keep sons than daughters from experiencing injuries, and when differences in preventability occurred, it was always the case that mothers judged preventability to be lower for sons than daughters. Hence, this decline in use of safety measures with increasing age for daughters but not sons probably occurs in reaction to age-related changes in different aspects of the children’s behavior. For daughters, relatively low levels of risk taking, a history of relatively few injuries, and increased compliance with rules (Morrongiello, Midgett, & Shields, 2001) may communicate that continued implementation of extensive precautionary measures is unwarranted as daughters grow older. In contrast, for sons, increased risk taking, more injury experiences, and decreased levels of compliance with rules (Morrongiello et al., 2001) may convince mothers of the need to continue taking precautions.

**Determinants of Mothers’ Practices**

The present results provide important information not only on what mothers do to prevent different types of injuries but also on why mothers make the choices they do with regard to these practices. The findings are clear: Mothers’ decisions are motivated by different factors, depending on the type of injury. For burns, cuts, and falls, about 30% of the variance in mothers’ engaging in specific injury-prevention strategies was attributable to child and parent characteristics that they believed made their child vulnerable for experiencing these types of injuries at home. Other aspects of the Health Belief Model (e.g., perceived severity, effort, preventability) did not directly influence maternal precautionary practices (see also Peterson, Farmer, & Kashani, 1990,
for older children). In contrast, different determinants contributed to explain mothers’ practices to prevent drowning, poisoning, and suffocation/strangulation/choking, with some health beliefs playing a significant role in their decisions. Beliefs that injuries would be severe in the case of drowning, poisoning, and suffocation/strangulation/choking led to mothers’ taking greater precautions. For poisoning, the amount of effort also played a significant role, with mothers taking fewer precautions when these involved more effort (see also Gielen et al., 1995). For drowning, mothers engaged in more precautions not only because they believed that child and parent characteristics elevated their child’s vulnerability for injury, but also because they judged environmental characteristics as doing so. Precautions to prevent suffocation/strangulation/choking were influenced by perceived severity of injuries and child and parent characteristics. Hence, mothers’ practices for preventing drowning, poisoning, and suffocation/strangulation/choking were influenced by a greater variety of factors than their practices for preventing cuts, burns, and falls.

Decisions by mothers not to engage in particular safety practices also related to beliefs about child and parent characteristics that influenced the child’s vulnerability for injury. When mothers believed that their child could manage risks or knew safety rules that the mother believed would ensure that the child would not interact with hazards, the mother saw no need to take precautions. However, prior research reveals that mothers typically overestimate their child’s knowledge of rules and ability to manage risk situations, thereby placing their child at elevated risk for injury (Morrongiello et al., 2001; Peterson, Mori, & Scissors, 1986). Mothers also did not engage in precautionary measures when they believed that supervision was sufficient to ensure the child’s safety, making the precaution unwarranted. Greaves et al. (1994) found an inverse relation between supervision and controllable hazards, with mothers reporting that they could engage in supervision as a replacement for making environmental modifications to prevent hazards at home. We cannot determine whether such a relation between supervision and safety practices exists in this sample. Suffice it to say that given that most injuries to toddlers occur in the home, despite their supposedly being supervised by parents, assumptions that supervision is a reasonable substitute for other precautionary measures would seem unfounded. Further research is needed to advance our understanding of how mothers integrate teaching, supervision, and environmental modifications in managing injury risk for toddlers at home (Morrongiello, Ondejko, & Littlejohn, in press, a, b).

**Implications for Interventions**

The present findings have implications for programs that aim to increase mothers’ safety practices to prevent injuries to toddlers at home. For all six types of injuries, communications or programs that raise awareness of child characteristics and/or parent attributes that elevate risk of child injury are more likely to be effective to promote behavior change than emphasizing environmental hazards per se. Hence, what mothers need to be convinced of is not that a hazard exists (i.e., environmental emphasis) but that their particular child, by virtue of how he/she is likely to behave in this situation or of attributes the child possesses, is likely to interact with this hazard, thereby creating risk of injury (Morrongiello & Dayler, 1996). For some types of injuries, such as drowning, poisoning, and suffocation/strangulation/choking, emphasizing the potential severity of that injury may also promote greater adoption of safety practices by mothers. The point is that the key determinants of mothers’ engaging in safety practices vary with type of injury. This knowledge can now be used to support innovative approaches to parent-directed interventions that target specific injury types.

Although a relatively new area of research inquiry, studies are beginning to appear that document the enhanced positive effects that can be achieved by using tailored messaging, as opposed to generic materials, in parent-directed interventions (Nansel et al., 2002). Traditionally, tailored communications are applied at an individual level (Kreuter, Strehler, & Glassman, 1999), but they can also be applied at a group level for populations who have particular common attributes, such as being a young mother or an older woman (Davis, Cummings, Rimer, Scandra, & Stone, 1992; Peppers & Rogers, 1993). The first step to planning such programs is a thorough understanding of the determinants of the problem behavior to be addressed. The present findings fill this gap in knowledge regarding factors that influence mothers’ home-safety practices for six types of injuries that commonly affect toddlers.

Information gathered about why mothers chose not to engage in a variety of precautionary measures also may prove useful for intervention programming. Specifically, such information can be used strategically to raise awareness among mothers of the kinds of maternal excuses that are typical, thereby allowing them to catch
themselves when they produce such excuses and to stop and more carefully consider alternative behavioral choices (i.e., engaging in the precaution). Drawing on psychological immunization theories (McGuire, 1972), this strategy of “inoculation” (i.e., making an individual aware of something she is likely to experience, thereby triggering a stop-and-think reaction that might lead to resistance to risk taking) has been used successfully with teens to promote smarter en vivo decisions about health-risk behaviors, such as alcohol and drug use (Tobler, 1986, 1995) and smoking (Glynn, 1989).

In conclusion, the present study identifies key determinants of mothers’ home-safety practices for preventing burns, cuts, falls, drowning, suffocation/strangulation/choking, and poisoning to toddlers. The findings also reveal why mothers make choices not to engage in particular home-safety practices. Both sets of findings can serve as a basis for innovative and targeted, injury-specific prevention programs to achieve greater injury control for young children.

Acknowledgments

This research was supported by a grant from the Social Sciences and Humanities Research Council. The authors extend their thanks to the parents for their enthusiastic participation, to Kathy Major and Elyse Peasley for assistance with data entry, and to Shawn Matheis for assistance with data analyses.

Received October 8, 2002; revisions received April 21, 2003 and August 5, 2003; accepted August 13, 2003

References


Developmental and Behavioral Pediatrics, 16, 362–370.


