

Asking the experts: Developing and validating parental diaries to assess children's minor injuries

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Asking the experts: Developing and validating parental diaries to assess children's minor injuries

Abstract (146 words)

The methodological issues involved in parental reporting of events in children's everyday lives are discussed with reference to the development and validation of an incident diary, collecting concurrent data on minor injuries in a community study of children under eight years old. Eighty two mothers participated in a comparison over nine days of daily telephone interviews and structured incident diaries. Telephone methods resulted in more missing data, and participants in both groups expressed a preference for the diary method. This diary was then validated on a sample of 56 preschool and school-aged children, by comparing injury recording by a research health visitor with that of their mothers. Each failed to report some injuries, but there was good agreement overall, and in descriptive data on injuries reported by both. Parental diaries have the potential to provide rich data, of acceptable validity, on minor events in everyday life.

Introduction

Parents (usually mothers) are often used by researchers as sources of information about their children, particularly when studying events or behaviours that are not easily observed, for example because their incidence is unpredictable (e.g., crying; St. James-Roberts, Conroy and Hurry, 1997), or because direct observation would be too intrusive or time-consuming (e.g., sleep; Bates, Viken, Alexander, Beyers, and Stockton, 2002). This approach requires that parents act as researchers, collecting data about events in their children's daily lives. It relies on parents' expert knowledge of their children, but demands the question of whether parents also have the necessary expertise for data collection. The answer is likely to depend on the methods used. As an example of such a method, this paper reports on the development and validation of a daily incident diary, in which parents recorded information about their children's minor injuries and the situations in which they were sustained.

Methods for studying everyday life

Memories are not factual records, but are constructed (e.g. Owens, Bower and Black, 1979). In particular, the distinctiveness of events affects their recall, with ordinary everyday events less memorable than those that are unusual or distinctive (Pearson, Ross and Dawes, 1992). Memories for ordinary events tend to be biased towards consistency with one's expectations (Owens, Bower and Black, 1979). Memory is also a function of time - the more distant the event, the more likely it is to be forgotten (Croyle and Loftus, 1992). These observations highlight challenges for research that relies on respondents' remembered accounts of events in everyday life, and indeed,

Pearson and colleagues (1992: 89) suggested that researchers might best 'avoid using retrospectively based methods altogether'. But what are the alternatives?

Diary methods

Diaries have been used extensively to study both health-related events (Rogers and Nicolaas, 1998; van Wijk, Huisman, and Kolk, 1999; Johnson and Bytheway, 2001; Parkin, Rice, Jacoby, and Doughty, 2004), and child behaviour (e.g., St. James-Roberts et al., 1997; Pearcey and De Castro, 1997; Bates et al., 2002). However, by virtue of their use to study unobserved events or behaviours, it can be difficult to establish the validity of research diaries. Reported evidence of their validity varies, although they have compared favourably with retrospective methods in terms of the volume of data reported (Gibson 2002; Parkin et al. 2004).

Diary methods are not without problems. As a self-report measure that is completed in the researcher's absence, the diary places high demands on participants, for example in terms of literacy skills and motivation to participate. Diary studies may be prone to sample bias (if participants are excluded, or refuse to take part, or drop out from the study because diary completion is difficult or unmanageable), and to missing or poor quality data (if the diary is completed incorrectly) (Barr, Kramer, Boisjoly, McVey-White, and Pless, 1988; Johnson and Bytheway, 2001).

The manageability of diary completion is related to study duration. Many studies have asked participants to complete a daily diary for between one and two weeks (Pearcey and De Castro, 1997; Fuligni, Yip, and Tseng, 2002; Ducharme, Doyle, and Markiewicz, 2002), and sample attrition is a potential problem for studies collecting diary data over longer periods (Dal Santo, Goodman, Glik, and Jackson, 2004). Even short periods of data collection can prove unmanageable for participants:

St.James-Roberts, Conroy and Wilsher (1996) found that 82% of their community sample of 160 mothers of young infants kept a crying diary for one day, but only 56% completed three days.

Telephone interviews

Telephone interviewing offers an alternative method for collecting data on daily life, although it is less commonly used than research diaries. McHale, Crouter and colleagues (e.g. McHale, Crouter and Tucker, 2001; Crouter, Tucker, Head, and McHale, 2004) have used this method extensively to study parents' knowledge of children's daily lives, and their findings have indicated the predictive validity of data collected by daily or almost daily telephone interviews.

Repeated telephone interviewing may address the risk of sample bias and of attrition in diary studies conducted over long periods. Demand on participants is lessened, relative to self-report measures, because the researcher retains responsibility for making contact and asking questions. McHale et al. (2001) reported that only two families in their sample of 203 dropped out during their three year study (data were collected during one month each year). Data recorded by an 'expert' researcher during a telephone interview may also be more likely to be complete and accurate than the same data recorded in self-report diaries. Hoppe, Gillmore, Valadez, Civic, Hartway, and Morrison (2000) compared self-completed diaries and telephone interviews as methods of daily data collection over an eight week period, and reported that telephone interviews produced less item-level missing data and 'cleaner' data.

Both frequent telephone interviews and diary completion make high demands in terms of respondents' commitment to and cooperation with the research, and a self-

report diary might be less intrusive for respondents than frequent telephone calls. Participants might conceivably manage such intrusion by not answering the telephone, and indeed, Hoppe and colleagues noted that telephone interviews resulted in more missed days of data collection (for example, because a participant was unreachable on a given day) than diaries, a difficulty which could cause significant data loss in a study of shorter duration.

Another possible disadvantage of telephone data collection is that a daily interview still requires retrospective recall of events, possibly giving rise to omissions or other reporting errors. Data collected in an incident diary are potentially contemporaneous, if the participant is asked to record an event as soon as it happens, and may have particular value for the study of unmemorable events. That observation has particular relevance with regard to the research reported here, which posited that minor injuries are part of ordinary childhood experience, associated with the physical and developmental demands of everyday activities. As such, the experience of very minor injury for young children may be difficult for parents to recall with accuracy.

Studying childhood injuries

Minor injuries are common among young children (Robertson, Barbor, and Hull, 1982), yet little is known about the normal developmental experience of childhood injury. Workers in children's services may be called on to make judgements in relation to child protection – and specifically, the identification of physical abuse or neglect – about whether the number or position of a child's injuries, or the extent of parents' knowledge about the origin of those injuries, are within the normal range. To provide a benchmark against which practitioners may make such judgments, our research aimed to create a normative profile of childhood injuries; that is, to establish

what sort of minor injuries ordinary children sustain at different ages, and where, and how. This aim depended on documenting all injuries that children in the study experienced, however minor, and whether of known or unknown origin.

Minor injuries such as scratches or bruises have little to make them memorable: they are unlikely to require professional treatment, may be frequently occurring, and are associated with ordinary childhood activities such as running and playing. Bruised tissue can take some time to show discolouration, so may not be apparent when the injury is incurred. It could be difficult to collect data on the circumstances in which minor injuries are sustained, if the injury-causing event is likely to be forgotten, or simply not noticed because no injury is evident at the time.

Previous community studies of injuries (Peterson, Harbeck and Moreno, 1993a; Peterson, Moreno and Harbeck-Weber, 1993b; Peterson, Brown, Bartlestone and Kern, 1996; Morrongiello, Ondejko, and Littlejohn, 2004a, b; Dal Santo et al. 2004) have demonstrated the potential usefulness of concurrent recording, and of parental diaries, when the reporting threshold for injuries is set relatively high. However, these studies have tended to exclude less memorable injuries or injuries that were not immediately identifiable. Could an injury diary provide an adequate means of collecting data for the present study? The aim of describing 'normal trauma' necessitated a very low reporting threshold: an injury was defined as any incident in which the child suffered physical harm or damage (including very minor tissue damage). Thus, the research required a valid method for collecting daily data on all injuries sustained by children, including the most minor injuries.

Any method based on recording visible injuries, with retrospective recall of the incidents in which they were incurred, would produce incomplete and unreliable

contextual data about injuries sustained in the course of frequently repeated commonly occurring activities, because such events are not easily memorable. Equally, however, a method that relied on recording injuries from the basis of the 'injury incident' alone would result in data loss for injuries of unknown origin. Morrongiello et al. (2004b: 436) commented that young children are 'especially prone to carry on (e.g., cry, whine, suggesting pain)', suggesting that event-based recording would also produce data on incidents in which the child appeared to be hurt at the time, but where there was no injury. These researchers addressed this problem by excluding incidents with no immediate evidence of tissue damage, a practice that would exclude data on many bruises. An alternative strategy, which would account for the possibility that an injury such as a bruise or swelling might appear some time after the incident, would be to combine event-based recording with daily physical examination of the child.

A further point is that both accidental and non-accidental injuries to children, particularly if they are more than very minor, are likely to be a source of guilt and regret to parents. Acceptable ways of tackling self-blame and guilt need to be explored, to devise a methodology that minimises socially desirable responding, such that the data obtained are accurate and valid.

Objectives

In light of the above considerations and of the literature discussed here, we set out to achieve the following objectives:

- to devise a method for collecting (close to) contemporaneous information about injury incidents, in conjunction with regular physical examination and reporting of visible injuries;

- to ensure that the methodology was acceptable to, and manageable for, research participants;
- to establish the validity of that method.

Within these objectives lie two separate methodological questions. The first question - how best to collect contextual information about minor injury events – was addressed through a process of iterative piloting, culminating in a comparison of telephone and diary data collection. The second question relates to the accuracy of parental recording of injuries (rather than incidents), and was examined through comparison of injury recording by parents and by a health professional.

The pilot study

Sample

In total, 190 families participated in the development of a measure for recording children's minor injuries. Initial unstructured interviews were conducted with a volunteer sample of 70 parents (nearly all mothers) of children living in a large city, who were attending a primary school, a nursery school, or one of four parent-toddler groups. This phase of piloting explored parental recall of children's injury experiences, and was used to develop a non-threatening form of approach to parents. A further 36 parents participated in increasingly structured interviews, and tested and gave feedback on early designs for methods of injury recording.

Subsequently, 82 parents, recruited from a large inner-city general practice, took part in a more formal comparison, over a nine day period¹, of injury diaries and daily telephone calls. Fewer than 10% of families approached to participate at this stage declined to take part, suggesting that early piloting was successful in developing an acceptable approach to parents.

Methods

The telephone interview and the injury diary were designed to collect identical data about injury 'incidents' and visible injuries on the child. Parents provided information on all events during the nine day period that took place when the child was nominally in the care of the parent. An event was defined as any incident when the child appeared to have been hurt, even when no tissue damage was evident. Incidents occurring when the child was being cared for by others away from home, (e.g., in school or in other forms of out-of-home childcare) were not reported, because early piloting suggested that parents did not have enough knowledge about the event to give reliable answers to detailed questions. For both methods, parents were also asked to conduct a daily injury check: a physical examination of the child at approximately the same time each day, for example while dressing in the morning, or at bath time, in which the parent recorded all visible injuries no matter how minor (regardless of injury age or whether the injury origin was known)².

¹ Following iterative piloting, nine days was judged to be of adequate duration for the occurrence of sufficient numbers of injuries to provide power for statistical analyses, balanced against evidence from previous research that longer data collection periods can be associated with sample attrition or under-reporting.

² Information about the nature of any injuries sustained when the child was not in parental care was collected through the daily injury check.

Comparison of injury recording methods

Forty six parents participated in the first comparison of diary and telephone methods (23 in each group). Parents were randomly allocated either to receive daily telephone calls, or to complete daily injury diaries, for a nine day period. Mothers in the telephone interview group were visited and the study explained, and then asked to identify a time of day when it would be convenient to receive a daily telephone call. Most suggested early evening. The researcher then telephoned the parent each day, for nine days, at the suggested time. For the diary group, the researcher explained how to complete the diary at the initial visit, and left it with the mother, having arranged a second visit to collect the diary after nine days.

Both methods produced comparable rates of incidents and new injuries sustained, although respondents interviewed by telephone reported higher numbers of 'old injuries' (table 1). However, most families using the telephone method could not be contacted on at least one of the nine days (mean number of days contacted = 6.7; s.d.=2.7; mode = 8). Following this comparison, and in the light of comments from participants, the diary was simplified, and a further trial was conducted with 29 parents completing the restructured diary, and an additional seven respondents receiving daily telephone calls (to balance group sizes). The revised diary had two sections:

- i. 'event sheets', on which the respondent recorded information about any incident where the child appeared to have been hurt (including a description of any visible tissue damage, and contextual information about the injury-causing event);

- ii. 'the daily injury check', for which respondents conducted a physical examination of the child at the same time each day, recording any visible injuries on diagrammatic pictures of a child (front and back view), and completing a short series of questions about the child's day (e.g., time in out-of-home care; mood/health).

Analyses showed no statistically significant differences between the methods in the numbers of incidents and injuries recorded, but non-significant trends indicated somewhat higher levels of reporting with the revised version of the diary (table 1). Participants gave feedback on the method of data collection, and most mothers in both groups expressed a preference for the diary method. Consequently, the injury diary was selected as the main method of collecting data on children's injuries.

INSERT TABLE 1.

The validity study

Sample

Validation of the diary's daily injury check was conducted using a consecutive random sample of parents who were participants in the main study (total N=662) (Smith, Boddy, Hall, Morse, Pitt, and Reid, 2004). Parents of 56 children took part in the validity trial, 27 pre-school children (aged 2-3 years: 12 male and 15 female) and 29 school children (aged 5-6 years: 17 male and 12 female). The sample was drawn from patient lists of two general practices involved in the research, one suburban (N=36) and one inner-city (N=20) practice.

Methods and procedure

During an initial visit to the family home to explain the research, mothers were invited to take part in an additional task for the study. With their consent, the procedure for the validity study was explained. As for the main study, they were asked to complete the diary for nine consecutive days, and the researcher arranged to collect the diary and interview the mother after the diary was complete. For validity study participants, an appointment was made for a research health visitor to come to the family home during the diary completion period. At this visit, the child was physically examined by the mother (without the health visitor present), and each injury she observed on the child was recorded on a 'daily injury check' record form (figure 1). The health visitor then independently conducted the same procedure in the presence of the mother. Both documented the location of each injury on the child's body, injury type (bump, bruise, cut/graze/scratch, burn/scald, crushing injury, or 'other'), size and whether the injury was old or new.

Analysis

Criteria of increasing specificity were applied to assess the level of agreement between the health visitor and the mother, on the presence or absence, and nature of injuries on the child. These ranged from agreement on whether or not there were any injuries on the child, to the number of injuries the child had, through to precise match by injury type and details, as well as the specific location of each injury recorded. The extent of inter-rater agreement was analysed using percentage agreement, Pearson's correlations and t-test comparisons as appropriate.

Results

There was complete agreement between the mother and the health visitor (HV) on whether the child had any injuries, and no children for whom no injuries were reported. There was also a moderately high correlation (Pearson's $r = 0.77$) between the total number of injuries reported by mothers and the health visitor. The health visitor reported an average of eight injuries on each child (mean = 8.05, s.d. = 4.10), and mothers an average of seven (mean = 6.93; s.d. = 3.52; $t = 3.16$, 55 df, $p < 0.005$).

INSERT FIGURE 1

In total, 583 injuries were reported by the mothers, the health visitor, or both (figure 1). Most injuries (60%; $n = 350$) were on the children's legs, and three-quarters (439 injuries) were less than 1cm in size. Almost all were bruises (280 injuries; 48%), or cuts, scratches and grazes (261 injuries; 45%) (figure 2).

On the most stringent criterion, precise injury-by-injury match, 42% of injuries ($n = 243$) were reported by both the mother and the health visitor, while 35% (202 injuries) were reported only by the health visitor, and 24% (138 injuries) only by the mother. Inter-observer agreement varied dependent on the nature of the injury, in terms of its size and its location on the child's body (figure 3). Larger injuries were less common than small injuries, and were more likely to be recorded by both observers. The health visitor usually recorded more injuries than the mother, but this was not always the case. Almost two-thirds of small (<10mm) arm injuries recorded

by the health visitor were not recorded by mothers (51/80), but the health visitor 'missed' 60% of injuries on the head that mothers reported (18/30).

For injuries reported by both the mothers and the health visitor, there was good agreement in the descriptive data recorded. For injury type (bruise, cut, etc.), agreement was 82% (198/242); and agreement in terms of specific injury location (based on precise categorisations such as 'cheek', 'jaw') was 94% (228/242). More global categorisation of injury site (e.g., leg, head, torso) indicated 99% (239/242) concordance between observers. Inter-rater agreement for injury age was 67% (162/242 injuries); this lower level might have arisen because mothers' ratings were informed by historical knowledge of when injuries were incurred, whereas the health visitor's ratings relied on visual appearance.

Discussion

Diary or telephone?

With some limitations, the injury diary had advantages over telephone interviewing as a means of parental recording of visible injuries on the child. Evaluation of the accuracy of parents' descriptions of injury-causing events was not possible in the present study, and so analysis focused on the volume of incidents reported, a strategy used in other validity trials of diary methods (e.g. Parkin et al. 2004). Non-significant trends indicated somewhat higher levels of reporting of both injuries and injury-causing incidents using the diary, suggesting this method was associated with less data loss than a daily retrospective telephone interview. Anecdotal accounts indicated how forgettable children's minor injury events could be. During one

telephone interview, a mother commented that one of her two daughters had hurt her hand, but she could not remember which child had been hurt (neither had a visible injury at the time of the call).

Respondents preferred the diary, an important consideration in research demanding a high level of participant commitment. The daily telephone call depended less on participants' motivation, but was seen as more intrusive and less adaptable to variations in daily routines. In line with the findings of Hoppe and colleagues (2000), daily telephone interviewing was more likely than the diary to result in 'lost days' of data collection because respondents were unreachable. Calls were sometimes missed because plans changed unexpectedly, such that the parent was away from home at the time of the telephone call. Diaries, by contrast, could be portable. Respondents were encouraged to keep the diary with them, recording injury events contemporaneously whenever possible, while the 'Daily Check' section encouraged same-day retrospective reporting of events that were not recorded contemporaneously.

An acceptable approach

Methods of data collection can influence reporting levels when socially desirable responding is a concern (e.g. Gmel, 2000). Children's injuries are a sensitive topic for inquiry, and participants may be concerned that the researcher could make judgements about the adequacy of parental care (in relation to physical abuse or supervision and safety). Dal Santo and colleagues (2004) cited parental censoring of injury information as a cause of under-reporting in one-third of their sample. For the present study, iterative piloting proved valuable in developing an acceptable method of approach that ameliorated potential concerns. It was explained that the research

team viewed mothers as experts in their children's everyday lives, and wished to learn from them about minor injuries as part of children's normal developmental experience.

Response rates indicated that this rationale was acceptable to parent. In the main study almost 92% of those invited to participate agreed, and of those only 13% (104 out of 798 families) did not complete the research diary (Smith et al., 2004). Ryan, Scott, Reeves, Bate, van Teijlingen, Russell, Napper and Robb (2001) suggested that methodological quality should be judged in terms of acceptability to participants, in addition to traditional quantitative research criteria, and the injury diary apparently succeeded in this regard. The diligence and motivation of those parents who did complete the task was striking. Higher levels of minor injury were described than in previous studies (e.g., Peterson et al., 1996), suggesting that the method succeeded in establishing a low threshold for reporting. Validity data showed that the majority of injuries reported by mothers were small (<1cm) bruises and scratches: the very evidence of normal developmental trauma that the study set out to uncover.

Injury recording

The major category of injuries that parents failed to record in the diary were very small scratches and bruises on the arms, and it seemed, from comments made by some mothers, that often these were simply not viewed as 'injuries'. In this, respondents appeared to share the perception of many injury researchers (e.g., Peterson et al., 1996; Morrongiello et al., 2004a,b), whose research focus and methods would also exclude such minor trauma. Nevertheless, this finding reinforces an observation made by St. James-Roberts and colleagues (1996): clarity of definition is critical in establishing methodological validity. Participants make

judgements about what is relevant or of sufficient import to disclose to the researcher. Researchers must take care to encourage participants to record all instances of the topic of study, and to exclude less relevant data themselves, rather than relying on respondents' potentially variable judgements of relevance. For the present research, instructions to mothers were modified following the validity study, to remind them to include all visible injuries, including any on the arms, however insignificant they seemed.

Using the most stringent criterion (precise match by injury type and details), overall inter-observer agreement in the validity study was only 42%. However, mothers reported 66% of all injuries observed, and it is striking that a quarter of all injuries were reported by mothers but not by the research health visitor, an experienced medical professional, trained in injury observation and recording for the present study. The mothers' historical and contextual knowledge of injuries sustained by the child made them superior observers for some small, hard-to-detect injuries. For example, one mother recorded a black eye on her child, because she knew the child had one, and so the residual bruising was evident to her, but unnoticed by the health visitor.

Conclusions

Longford, Ely, Hardy and Wadsworth (2000) made the point that missing data can rarely be avoided in large scale studies, and the present research is not exceptional in this regard. Not all injuries observed by the health visitor were reported by mothers, and vice versa. Although the injury diary produced somewhat higher levels of injury and incident reporting than daily telephone interview, both methods may have been subject to under-reporting. Minor injuries were likely to be sustained

during ordinary everyday events, as part of children's normal developmental activity. Most were very small (<1cm) and caused by bumping into something, or tripping or falling onto the ground – hardly memorable or unusual events in the busy life of a young child. If data on both injuries and incidents were likely to be incomplete, was the diary method 'fit for purpose'? Was it good enough?

Boaz and Ashby (2003) argued that fitness for purpose primarily depends on whether the method offers the most appropriate and effective technique for the aims of the research. In this, the diary arguably succeeded. Parents may have under-reported injuries and incidents, but they reported considerable detail of both, at a much lower level of severity than has been recorded elsewhere (e.g., Morrongiello et al., 2004a,b). Correspondence with health visitor reporting was sufficient to identify within-sample variation - for example, between individuals reporting higher or lower levels of child injury. This success in providing detailed normative data on the range of injuries experienced by young children in everyday life can be attributed to the following factors:

- an approach and data collection method that were acceptable to participants (not threatening or overly intrusive);
- a form of data collection that participants found manageable (not overly demanding in terms of study duration or the time and difficulty involved in participation);
- clarity of definition about what to report (participant judgements about what is relevant to include appeared to introduce a source of unreliability to the data);

- close to contemporaneous recording (to minimise the demand for participants to recall low salience high frequency events);
- separation of information on injury incidents and on visible injuries.

The process of methodological development reported here indicates that rich data, of acceptable validity, can be gathered by drawing on mothers' expert knowledge of their children and their daily lives. The research diary, completed over a relatively short period of time, offered a valuable method for studying incidents characteristic of everyday life - not easily observed and easily forgotten.

Table 1. Average daily reporting of injuries and injury incidents, by injury diary and daily telephone call.

		Daily telephone call N = 30	Version I diary N = 23	Version II diary N = 29
Number of events	mean (s.d.)	0.36 (0.30)	0.38 (0.35)	0.36 (0.32)
	range	0.00 - 1.00	0.00 - 1.11	0.00 - 1.33
Total number of injuries	mean (s.d.)	0.27 (0.22)	0.38 (0.33)	0.45 (0.32)
	range	0.00 - 0.78	0.00 - 1.11	0.00 - 2.00
New injuries reported	mean (s.d.)	0.14 (0.21)	0.18 (0.21)	0.26 (0.34)
	range	0.00 - 0.78	0.00 - 0.67	0.00 - 1.40
Old injuries reported	mean (s.d.)	0.59 (0.50)	0.36 (0.41)	0.65 (1.07)
	range	0.00 - 1.67	0.00 - 1.56	0.00 - 3.80

Figure 1. The Daily Check Sheet (showing locations of the 583 injuries recorded by parents and/or the health visitor)

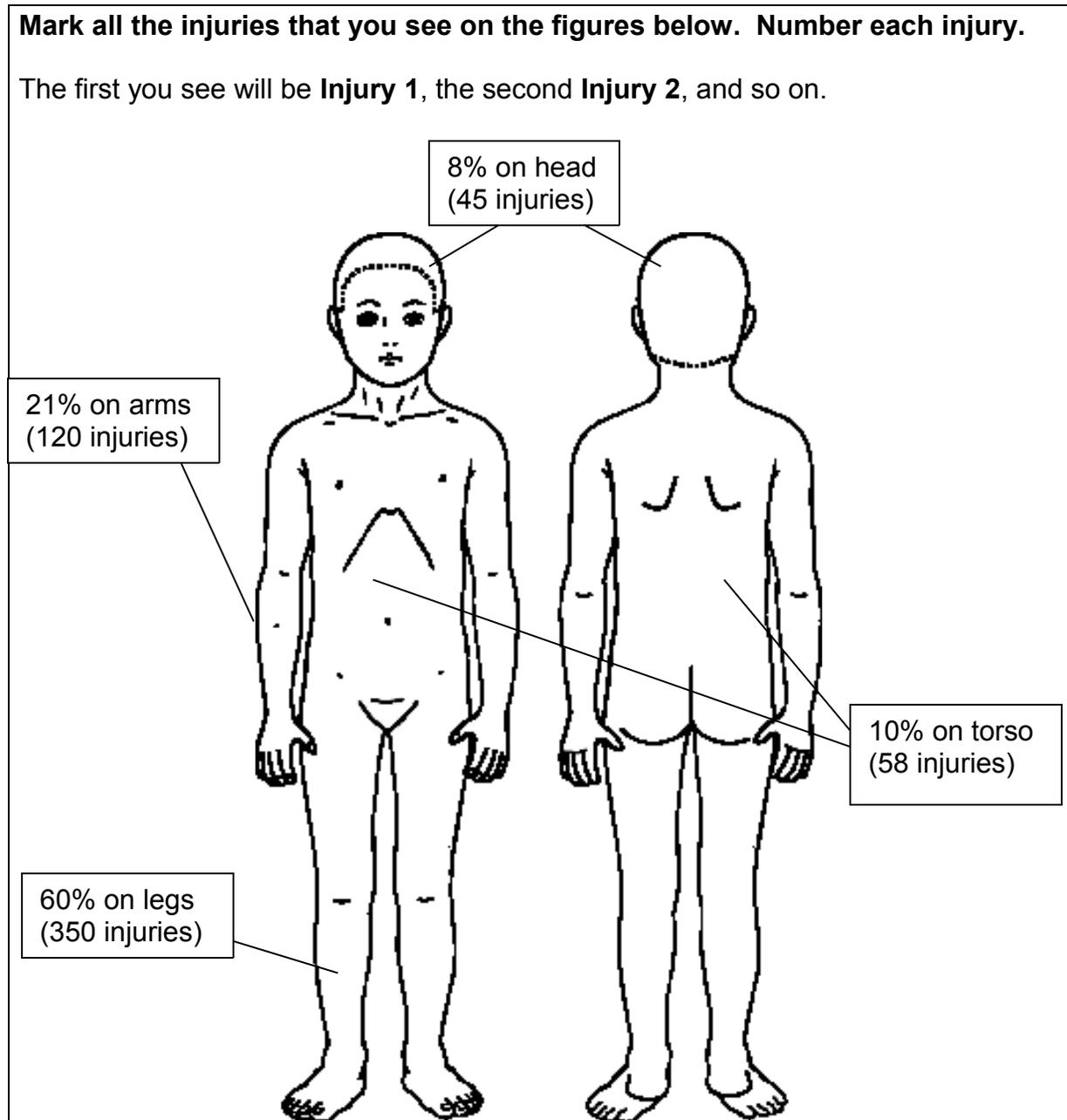


Figure 2. Number of injuries reported by the research health visitor, the mothers, and by both observers, by injury size and location.

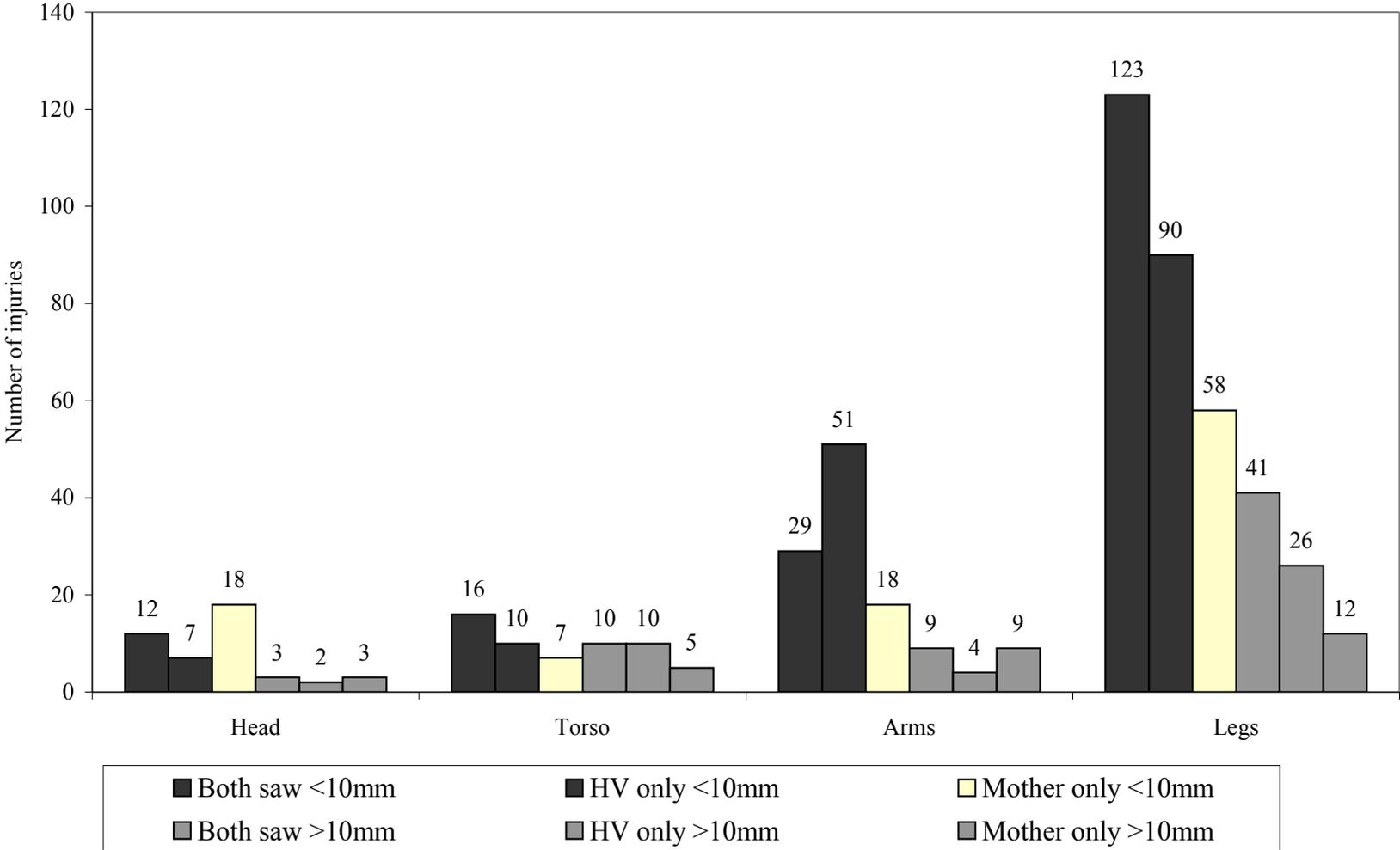
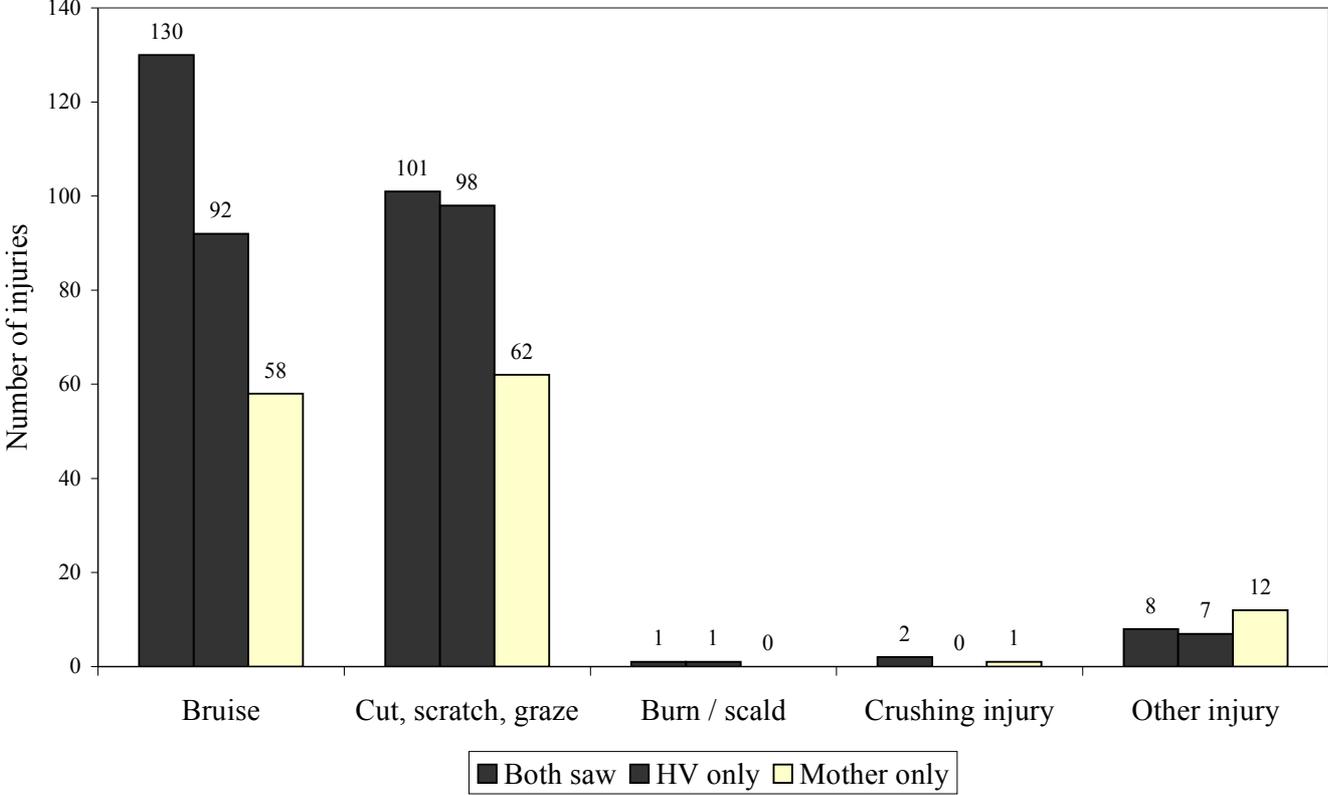


Figure 3. Number of injuries reported by the research health visitor, the mothers, and by both observers, by injury type.



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