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Planning and testing CATI-based injury prevention population surveys

Clare Bradley
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Planning and testing CATI-based injury prevention population surveys

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Executive summary

Computer assisted telephone interviewing (CATI) is an increasingly common survey methodology in the public health arena (Szuster 2003). CATI methodology has been applied both in highly specific areas of health behaviours research (Robertson et al. 2000) and broad-scale national health surveys (Bolen et al. 1999). In recent years, the CATI Technical Reference Group (TRG)—a subcommittee of the National Public Health Information Working Group—have been developing topic-specific question modules for population health surveys in conjunction with key informants (Szuster 2003, Wilson et al. 2001).

In 2004 the National Injury Surveillance Unit (NISU) published a discussion paper regarding the development of an injury-related question module, in consultation with the CATI TRG (Bradley and Harrison 2004). The report discussed the application of CATI surveys in injury surveillance both in Australia and internationally. In summary, the report advocated the development of a CATI question module addressing behaviours, attitudes and knowledge regarding injury in order to complement existing national data on serious injury.

The development of CATI question modules is a rigorous process, including a cognitive testing phase, where the proposed question module is presented to a small number of respondents and analysed by cognitive psychologists, and a wider field-testing phase, which addresses reliability and validity issues using a test-retest protocol (CATI TRG 2003, Szuster 2003). Cognitive testing of the proposed injury question module was conducted at the ABS cognitive laboratory in September 2003 (ABS 2003), presenting questions addressing safety behaviours and practices, home and community injury concerns, injury preventability beliefs, alcohol and injury, and exercise participation in older people. Problems with interpretation and terminology were identified and response category refinements were also recommended. Questions regarding alcohol consumption and injury were identified as particularly problematic and it was recommended that this item be discontinued (ABS 2003).

Field testing of the injury question module, among others, was conducted in mid-2004 by the NSW Health Survey Program on behalf of the CATI TRG. The module used in the field tests was significantly truncated from that applied in the cognitive testing, retaining only questions relating to the presence of smoke alarms and first aid kits in the home and questions relating to falls in the elderly (more specifically, exercise in the elderly as exercise is known to reduce falls risk, e.g. Chang et al. 2004). Field testing of this version confirmed the issues identified in the cognitive testing phase, especially the importance of careful selection of wording and terminology in the questions. The field testing also demonstrated the limited utility of asking questions about falls injury incidence (unless the sample size is large) and questions regarding specific forms of exercise. From this we conclude that the injury module as tested here is of limited utility for injury prevention researchers and requires further development.

As both NISU and the CATI TRG felt that further development of the module was necessary in order to produce a question set which will be more relevant for both injury prevention research and inclusion in a standardised national question set, a joint workshop between the TRG and the Strategic Injury Prevention Partnership (SIPP) was hosted by the Public Health Information Development Unit (PHIDU) in Adelaide in

October 2004. Discussion involving members of these groups highlighted a structural difficulty confronting development of a module that would meet design constraints required by the CATI TRG (chiefly a very small number of items) yet provide information that is meaningful and useful to injury prevention policy makers and researchers. A result of this workshop was the establishment of the Injury Prevention Population Surveys Interest Group (IPPSIG). IPPSIG is a web-based discussion list, intended to be a forum to promote and enable discussion and collaboration on the development and use of population surveys, and with the primary purpose being to provide expert advice to the CATI TRG on the further development of the injury question module.

Some discussion between SIPP and CATI TRG members was conducted via IPPSIG but the forum could not solve the conundrum of how to present questions which would be useful for injury prevention researchers in the scope stipulated by the CATI TRG's mandate. The CATI TRG required a very small set of closed-response questions however injury is a diverse topic with characteristics which complicate adequate coverage by such a question set. Prevalence of recent non-trivial injury is low, resulting in low positive response proportions for questions focusing on injury experience of respondents. Questions focusing on exposure to injury risk factors can avoid this constraint, but risk factors are diverse, requiring numerous questions if adequate coverage of the topic is to be achieved. Questions dealing with knowledge and attitudes concerning injury risk and injury prevention have potential for adequate coverage in a small question module but were outside the preferred scope of the CATI TRG. Further work needs to be conducted in both the development of a CATI injury module suitable for inclusion in the National Health Data Dictionary (NHDD) and, outside the mandate of the TRG, in the development of key indicator questions which generate useful and timely data for injury prevention professionals.

Introduction

Computer assisted telephone interviewing (CATI) is a methodology increasingly utilised in the public health arena both in Australia and internationally (Szuster 2003). Studies using CATI are able to access relatively large numbers of subjects at a comparatively low cost and the methodology simplifies the data processing component of the study (Ketola and Klockars 1999, see also Taylor et al. 1998, Wilson et al. 1999). CATI methodology has been applied in both highly specific areas of health behaviours research (Robertson et al. 2000) and broad-scale national health surveys (Bolen et al. 1999). The validity of this methodology in health research has been successfully demonstrated (Koziol-McLain et al. 2000, Starr et al. 1999, Stein et al. 1996).

In recent years, the CATI Technical Reference Group (TRG)—a subcommittee of the National Public Health Information Working Group—have been developing topic-specific question modules for population health surveys in conjunction with key informants (Szuster 2003, Wilson et al. 2001). The aims of the CATI TRG are to address the methodological and technical issues of (CATI) population health surveillance systems in Australia and to contribute to standard practices in surveillance that will form the basis of a nationwide system (CATI TRG 2003). The rigorous module development process is iterative and includes a cognitive testing phase, where the proposed question module is presented to a small number of respondents and analysed by cognitive psychologists, and a wider field-testing phase, which addresses reliability and validity issues using a test-retest protocol (CATI TRG 2003, Szuster 2003). Cost-effectiveness and question 'flow' can also be assessed through the field-testing phase. Field testing of modules addressing asthma, demographic characteristics and diabetes were field-tested during 2002 and a further three modules (alcohol consumption, cardiovascular disease and tobacco consumption) were put to field in 2003 (CATI TRG 2003, CATI TRG 2004).

In 2004, the National Injury Surveillance Unit (NISU) published a discussion paper regarding the development of an injury-related question module, in consultation with the CATI TRG (Bradley and Harrison 2004). The report discussed the application of CATI surveys in injury surveillance both in Australia and internationally. In summary, the report advocated the development of a CATI question module addressing behaviours, attitudes and knowledge regarding injury in order to supplement existing national data on serious injury.

We argued that a sampled survey may not have the capacity to adequately document serious injury and that existing collections regarding injury-related hospitalisations and deaths (the National Hospital Morbidity Database and the National Deaths Index) are superior to what information may be collected through population sampling. Additionally, some information on less serious injury is already collected through the Australian Bureau of Statistics' regular National Health Survey. As such, the lacuna in current Australian injury surveillance is information regarding behavioural risk factors for injury and knowledge and attitudes regarding injury and injury prevention. Collecting information on these topics through population sampling, such as that advocated by the CATI TRG, would be an extremely beneficial supplementary data source for injury prevention researchers and policy makers (Bradley and Harrison 2004).

To this end, we suggested a number of topics for inclusion in a CATI injury question module based on the proposed national Injury Prevention Plan Priorities for 2004 onwards (Pointer et al. 2003, SIPP 2004). That is, the elderly (75+ years), children (0–14 years), emerging adults (15–24 years), the Aboriginal and Torres Strait Islander population, the rural and remote population and alcohol and injury topics. We proposed several specific risk factor, knowledge and attitudes questions covering some aspects of these priority topics (Appendix A), drawn from existing Australian health surveys and work regarding injury knowledge and attitudes conducted in New Zealand (Bradley and Harrison 2004, Hooper et al. 2003). As very little work has been conducted on surveying injury knowledge and attitudes, we also included some un-trialled questions regarding respondents' assessment of the safety of their home and their neighbourhood and the main cause for concern regarding safety (if any) in these contexts. These open-ended questions were designed to highlight domestic/community safety issues which may not have been previously considered by injury prevention researchers, and so contribute to the development of future surveys and/or community safety research.

The National Injury Surveillance Unit's discussion paper was submitted to the CATI TRG in May 2003, and published in May 2004.

In this report we describe the development process for the CATI injury module, the results of the testing process thus far and the future directions for the module. The following sections describe the module testing process and the progress made to date on the development of the injury module. The final section discusses the issues left unresolved and suggests future work which may be of benefit to both the CATI TRG's mission and the surveillance needs of injury prevention researchers.

Module development

New question sets for population surveys undergo comprehensive pre-testing before application. Pre-testing can involve focus groups, discussing the proposed content, and formal cognitive testing involving psychologically-trained researchers who interview volunteers, observing not only the responses given to particular questions but also the way in which these answers have been derived. From this, the validity of the questions can be assessed (Szuster 2003). A pilot test, or field test, can then be conducted in much the same manner as the end-point survey but using a smaller sample size. Field testing can incorporate a test-retest methodology to assess response reliability and can be used to judge the efficiency and efficacy of the question set (Szuster 2003). The protocol followed by the CATI TRG incorporates both a cognitive testing phase and a field testing phase before question modules are finalised.

Cognitive testing

Development of a reliable CATI module requires thorough cognitive testing. Proposed question modules are put to small numbers of volunteer subjects and the responses are analysed by cognitive psychologists. Cognitive testing appraises the language, terminology and interpretation of questions, respondents' comprehension of question concepts, the appropriateness of response options and likely problems associated with recall periods (memory of events), topic sensitivity and question-length (CATI TRG 2001, Szuster 2003). Cognitive testing of the CATI TRG's proposed injury question module was conducted on behalf of the CATI TRG by the Australian Bureau of Statistics (ABS). Drawn directly from the NISU report (see Appendix B), the module was tested at the ABS's purpose-built cognitive laboratory commencing in September 2003. The results of the cognitive testing were analysed by staff of the ABS and presented to the CAT TRG (ABS 2003).

Forty participants in total were recruited from media advertisements and were interviewed in three rounds of questioning. Conceptual and question-wording problems identified in the first rounds of interviews allowed (limited) modifications to be made to questions for subsequent interview rounds (ABS 2003).

The cognitive interviews appraised the respondents' understanding of the concepts and terminology included in the questions (ABS 2003). That is, respondents' understanding of terms like 'injury', 'safety', 'neighbourhood', 'non-slip mat', 'preventable' and 'program of exercise'. The cognitive interviews also tested the flow of the questions and question module and the workability of the suggested response categories. Respondents' understanding of the concept of 'injury' was tested using a questionnaire detailing examples of injuries, events which could cause injury and 'non-injury' examples. Responses varied greatly and in particular, examples of poisoning and drowning were *not* considered by a large proportion of respondents to constitute an injury. Surprisingly, 42% of respondents did not consider 'cuts' to constitute an injury (ABS 2003). Similarly, large proportions of respondents rated the non-injury examples (e.g. occupational overuse syndrome) as injuries. The lack of a common definition of an injury or injury event was thought to influence the quality of responses across all sections of the CATI injury module.

Questions regarding falls were presented to all respondents regardless of age in order to increase sample size. Problems were identified in the coding of responses (i.e. the limited available response categories) and the concepts of 'a program of exercise' and 'low cost' (ABS 2003).

The question set also explored respondents' beliefs about their safety in their homes and neighbourhoods, with questions presented in two forms—an open-ended version and a guided response version (the original form of the question as suggested by NISU). Most respondents understood the concept of 'safe from injury' but had varying ideas as to what constituted their 'home' (the house, the garden, the whole property) or 'neighbourhood' (immediate surrounds, suburb, town). Many respondents replied that their primary concerns regarding their safety in their neighbourhood were related to criminal events (e.g. robbery, being attacked). Traffic issues were also mentioned (ABS 2003).

It was recommended that the response categories for the falls questions be altered to an open-ended response and categorised for analysis post-interview. It was also recommended that the concepts included in the questions be defined more tightly. With regard to the questions addressing safety beliefs, it was recommended that definitions of home and neighbourhood be more tightly constructed and that a screening question be included to eliminate respondents who did not have any safety concerns at all (ABS 2003).

Questions addressing safety practices in the home—the use of such things as smoke alarms and non-slip mats—were apparently more difficult for people to answer if they rented their home rather than owning it (ABS 2003). It was also clear that respondents had very different ideas as to what constituted a first aid kit (that is, an 'official' kit versus a collection of supplies like bandages and antiseptic). As a result, respondents who assumed that the question referred to 'official' kits may have answered negatively even if they had some form of first aid supplies in the home. Questions addressing smoke detectors and hot-water service temperature adjustment had similar conceptual problems and it was recommended that the response categories be revised. Unfortunately, the suggested revision for the smoke detector question was exactly as originally provided by Bradley and Harrison (Bradley and Harrison 2004).

Three versions of the injury preventability belief question were presented to respondents, giving progressively more detailed response categories. The more detailed response categories performed well, but the underlying problem of differing concepts of what constitutes an injury remained (ABS 2003).

The issue of alcohol and injury was addressed in a two-part question, firstly asking the respondent to report whether they had sustained an injury in the last four weeks and secondly, whether or not alcohol was a factor in this event. This question(s) was drawn from the question set being trialled by the ABS for the 2004–05 Indigenous Health Survey. Again the problem of a common definition of an injury affected this question, and respondents indicated that they would be less likely to be truthful in their responses on issues regarding alcohol-related injury and violence, raising further data quality issues (ABS 2003).

In summary, the cognitive testing of the proposed CATI injury module identified problems with the concepts and terminology presented. Many response category refinements were also recommended. While many of the problems identified by the

ABS were understandable and could easily be circumvented with re-wording, NISU considers that some of the conceptual 'problems' identified highlight exactly what these questions were intended to ascertain. That is, we advocated a question set to address injury attitudes, knowledge and beliefs to complement existing injury data sets and not to re-enumerate the incidence of injury in the population. As such, a certain degree of latitude must be allowed in the interpretation of the concepts included in the questions so not to artificially limit responses. For example, if differing concepts of 'neighbourhood' lead to some respondents answering in terms of their immediate surrounds and others in terms of their wider suburb, we are still gathering valid information on people's community safety concerns. In this regard, the ABS's recommendation to alter the falls and exercise questions to more open-ended questions to be categorised post-interview would greatly improve the module.

Field testing

One of the main objectives of field testing is to test the reliability of questions after they have been vetted through the cognitive interview phase of development. The process also tests the adequacy of the interview methodology; the instructions to interviewers and the length of survey (Szuster 2003). Subjects are presented with the question modules in the form in which they will eventually be delivered (i.e. CATI) and then re-interviewed after a number of weeks have elapsed. The consistency of responses, or lack thereof, indicate the extent to which the question is reliable and/or valid. The useability of the data collected and cost-effectiveness of the modules can also be assessed (Szuster 2003).

Field testing of question modules addressing nutritional food behaviours, musculoskeletal disorders, cancer (sun protection), physical activity and injury was conducted in mid-2004 by the NSW Health Survey Program, on behalf of the CATI TRG. NISU was not able to contribute to the revision of the module prior to the field test. The injury module used in the field tests was significantly truncated from that applied in the cognitive testing, retaining only questions relating to the presence of smoke alarms and first aid kits in the home, falls and current exercise levels in the elderly. The question set also included a number of questions enumerating falls in the elderly in the last 12 months. The specific questions asked in the field testing of the injury module are listed in Appendix C.

In the absence of a formal report on this work, the raw data from the CATI TRG's third field test was obtained from the ABS in September 2004 and analysed by NISU. Sample sizes varied between questions (and question versions). Eight hundred and thirty three respondents provided answers for the safety behaviours questions (smoke detectors, first interview), and respondents (both male and female) were aged between 16–92 years. Of these, 205 respondents were aged 65 years and over, and were asked the questions relating to falls and exercise as appropriate. As a result, sample sizes became extremely small for questions regarding specific types of exercise activities and how often these are undertaken. The vast majority of all respondents (98.9%) were re-interviewed some time after their initial interview so that validity measures could be ascertained. NISU's analysis of the data is presented below. Due to small sample sizes, analyses are not split by sex.

A high proportion of respondents at all ages reported having a smoke detector in their homes (Figure 1). Similar proportions of respondents reported having smoke detectors

in both the first and the second interview rounds. Respondents were then asked what type of smoke detector they had installed. A sizeable proportion of respondents (16%) answered that they did not know what type of detector they had in the first interview, but the question may have provoked respondents finding out as in the second interview this figure had fallen to 9% (Figure 2). As a consequence, higher proportions of respondents reported having battery-operated and hard-wired smoke detectors in the second round of interviews.

Similarly, more respondents answered that they had checked their smoke detectors in the last month/in the last six months in the second interview than in the first (Figure 3). As a result, fewer respondents did not know whether or not their smoke detector had been tested recently and fewer responded that their detector had never been tested in the second interview. This response category ('never') was problematic however, as both respondents who have a smoke detector but have never tested it and respondents who do not actually have a smoke detector to test may have answered in this way. As suggested in the cognitive testing report, the initial 'do you have a smoke detector?' question should be used as a screening question to eliminate responses from people who do not actually own smoke detectors (ABS 2003).

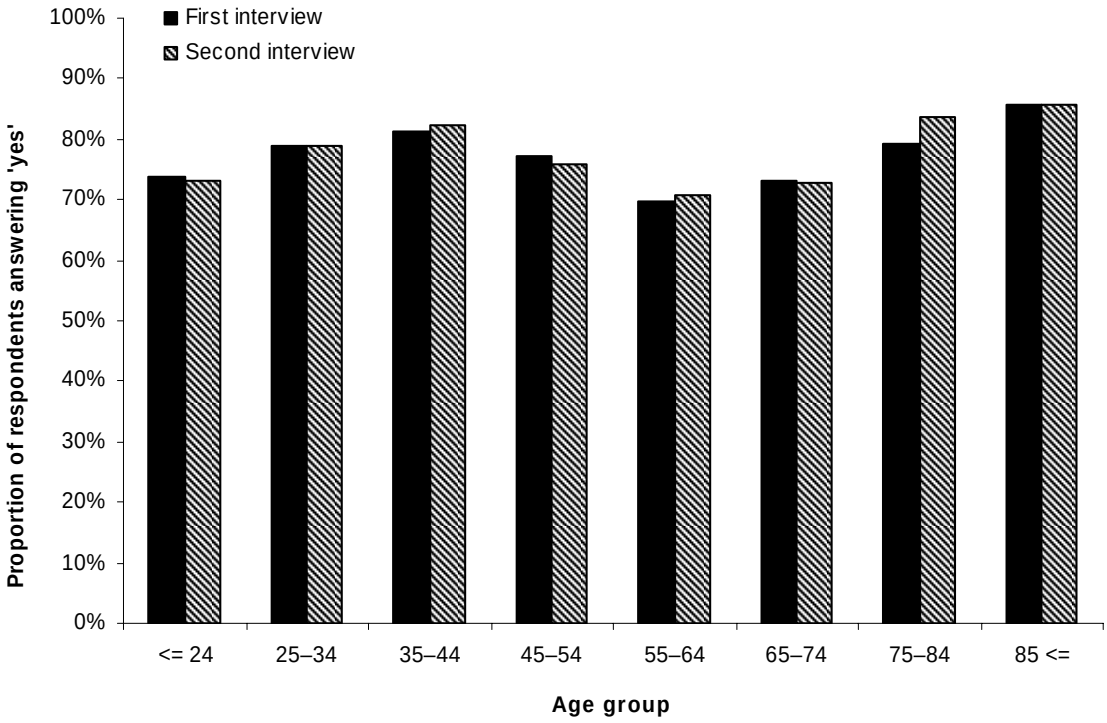


Figure 1: Proportion of respondents answering 'yes' to the question 'Do you have smoke detectors in your home?'

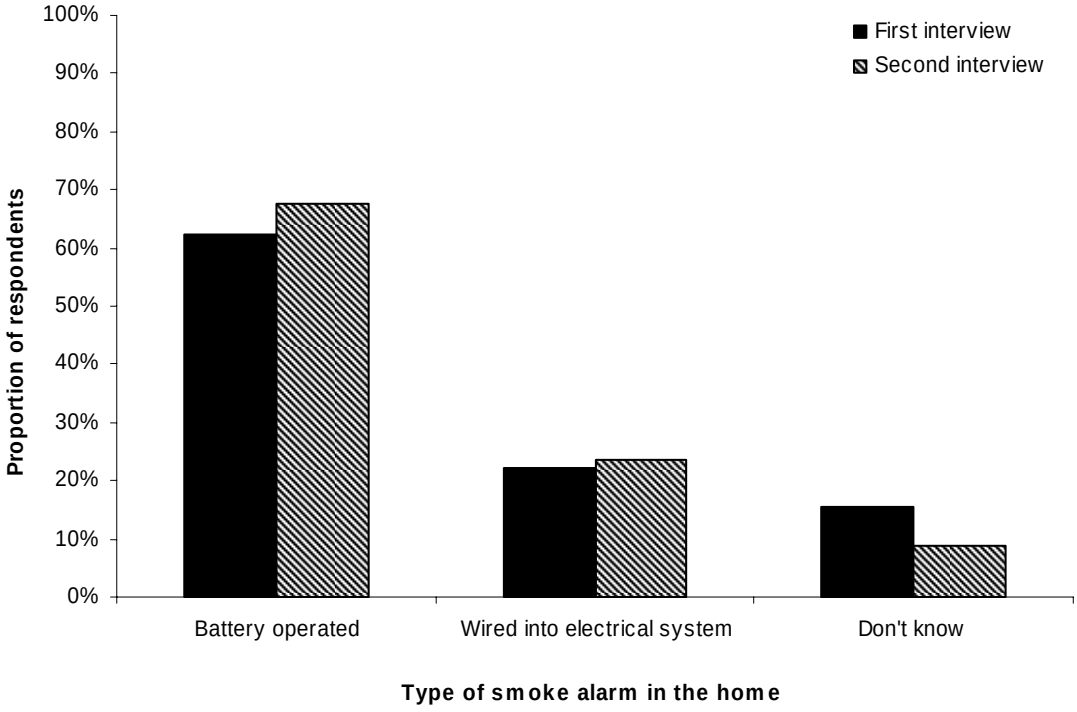
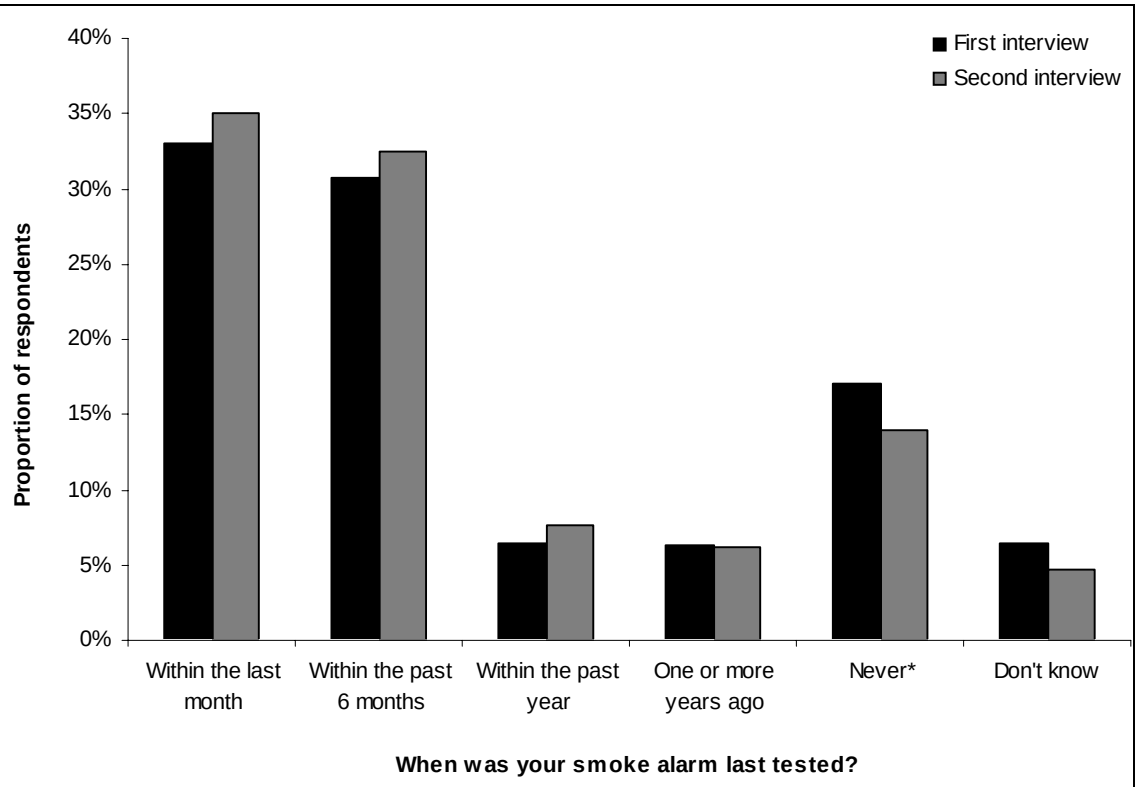


Figure 2: All-ages (total) responses to the question 'what type of smoke detector do you have in your home?'



* 'Never' may include respondents who have a smoke detector but have never tested it or respondents who do not actually have a smoke detector to test.

Figure 3: All-ages (total) responses to the question 'When was the last time you or someone else deliberately tested all of the smoke detectors in your home?'

To address the problem of interpretation in the use of the phrase 'first aid kit' identified during cognitive testing of the injury module, 276 respondents were asked both 'do you have a first aid kit?' and 'do you have supplies of bandages, bandaids, antiseptic or other first aid equipment in your home?' during the first interview round (an additional 557 respondents answered 'yes' to the first question and were not asked the second). Of the respondents who answered 'no' to the first question (n=268), 94% answered 'yes' to the second, implying that most did not consider first aid supplies to constitute a 'kit' (see Figures 4 and 5). Similarly, of those answering 'no' to the first aid *kit* question in the second interview round (n=255), 95% answered 'yes' to having first aid *supplies*. These results support the conclusions of the cognitive testing phase; that such a question be worded in terms of first aid supplies in order to avoid false negative responses when using the word 'kit' if the intent of the question is to ascertain whether or not people have the supplies at hand to attend to minor household injuries (ABS 2003).

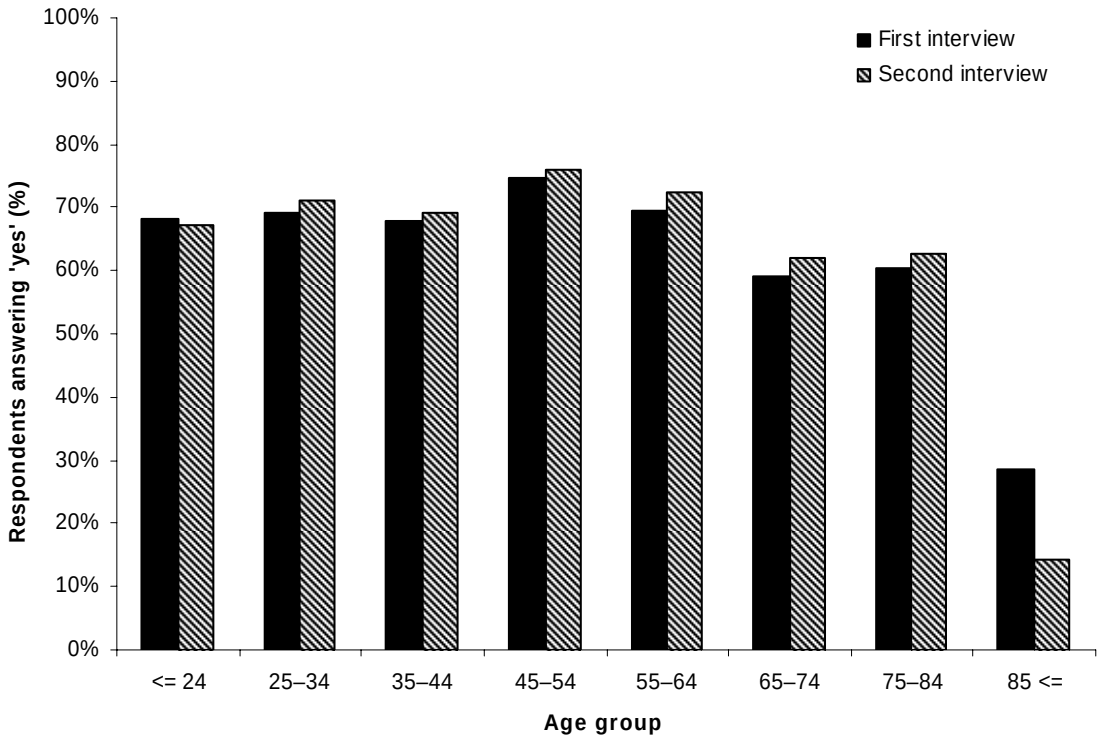


Figure 4: Proportion of respondents answering 'yes' to the question 'Do you have a first aid kit?'

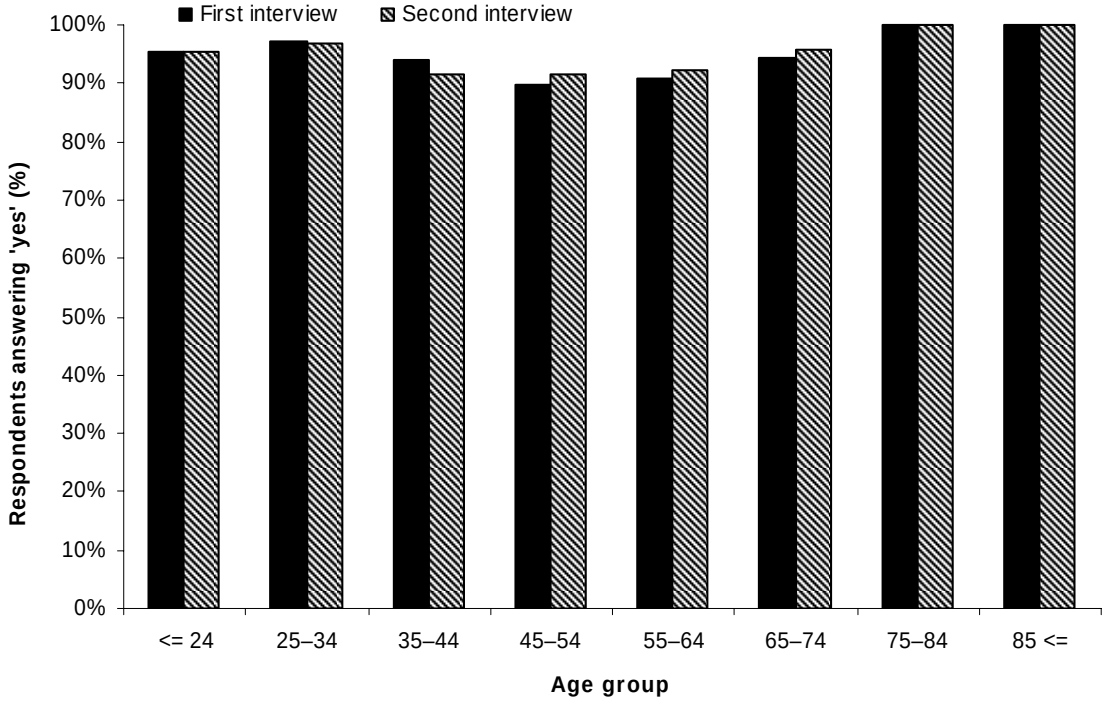


Figure 5: Proportion of respondents answering 'yes' to the question 'Do you have supplies of bandages, bandaids, antiseptic or other first aid equipment in your home?

Respondents aged 65 years and over were asked a number of questions relating to falls and types of exercise undertaken. In the first interview, 26% (n=54) of respondents had had a fall in the previous 12 months and most of these (52%) had only had a single fall in this time. Similar results were reported in the second interview (59 respondents—29%—had had a fall, and 49% had had only a single fall). The majority of these falls (65% in the first interview and 64% in the second) had not required medical attention and less than half of these had required hospitalisation (42%—8 cases—in the first interview and 29%—6 cases—in the second).

Most respondents reported 'currently' exercising (78% in both interviews). Fewer respondents reported 'usually' undertaking exercise (worded to account for transient exercise-preventing health/life conditions) in the first interview—75%. However more respondents reported 'usually' exercising in the second interview—82%. Many respondents reported undertaking walking as a form of exercise (> 70% in both interviews), but few participated in the other nominated forms of exercise; exercises at home (< 15%), exercises in a group (< 7%), swimming (< 4%), and dancing (< 4%). Two in five respondents indicated that they participated in 'other' forms of exercise (41% in interview one and 38% in interview two). Other forms of exercise as reported by respondents included; lawn bowls, gardening, cycling, bushwalking, tennis, weights, tai chi, running and housework.

The low number of respondents reporting serious falls (hospitalised) is indicative of the limited use of such a question in a population survey, as previously suggested by NISU. The field testing of the exercise questions also demonstrated that the specific forms of exercise mentioned were of limited applicability, in that a very wide range of activities are undertaken by people aged 65 and over.

In summary, the field testing of this version of a CATI injury module confirmed the issues identified in the cognitive testing phase; the importance of careful selection of wording and terminology in the questions. The question set used for cognitive testing was already minimal in the sense that it covered only some aspects of injury, in a superficial manner. The modified subset of these questions taken to field test demonstrates the consequences of attempting to reduce the question set even further. While findings concerning the performance of particular questions have some value, the field tested module as a whole does not provide a coherent picture relevant to injury prevention in Australia. The field testing also demonstrated the limited utility of asking injury incidence questions. The tested questions concerned falls by older persons and consequent injuries. The proportion of persons in this age group reporting a fall in the previous 12 months was broadly similar to values found in other studies (Public Health Division 2000a). However, the validity of this finding looks doubtful, since it has been found that recall bias becomes considerable when people are asked to recall injury-related events more than a few weeks before questioning (Harel et al. 1994, Jenkins et al. 2002, Warner et al. 2005). If seeking medical attendance is taken as suggesting the possibility of non-trivial injury, then less than 10% of respondents aged 65 or older reported a fall-related injury. Had the recall period been set to a length more likely to provide valid responses (e.g. four weeks, as in the ABS National Health Survey), then the proportion of respondents reporting such injury would have been much smaller; in the order of one percent. For CATI surveys of typical size (one to several thousand respondents) estimates of this size have quite low precision, limiting their value for estimating rates and trends. From this we conclude that the injury module as tested here is unsuitable for the purposes of inclusion into a standardised, national question set and requires further development.

Injury Prevention Population Surveys Interest Group

Following the field testing of the prototype injury CATI module NISU (and the CATI TRG) felt that further development of the module was necessary in order to produce a question set which would be more relevant for injury prevention research. On the 21st of October 2004 a joint meeting of interested members of the CATI TRG and the Strategic Injury Prevention Partnership (SIPP) was held in Adelaide to discuss the injury CATI module. The aim of the workshop was to brief SIPP members on the CATI TRG's work to date concerning injury, its future plans, and how these might relate to the interests and plans of SIPP members. The workshop also briefed CATI TRG members about SIPP members' views on the types of information obtainable from CATI and other surveys likely to be useful for injury prevention and related activities.

The workshop was viewed to be success by the participants. The iterative testing process of the CATI health modules, the length limitations of question sets (only a small number of questions are able to be included in CATI modules) and the specifications of questions suitable to be included in the National Health Data Dictionary (NHDD)—the intended repository of the CATI TRG-developed health modules were discussed in detail. In association, the themes and topics pertinent to injury prevention researchers were discussed, with the view to establishing a number of basic questions from which valid data could be obtained from a population survey.

As a result of the workshop, a SIPP-led internet discussion group, moderated by NISU, was developed. The Injury Prevention Population Surveys Interest Group (IPPSIG, https://listserver.flinders.edu.au/mailman/listinfo/ippsig) was established in December 2004, with the intent to be a forum to promote and enable discussion and collaboration on the development and use of population surveys, and with the primary purpose being to provide expert advice to the CATI TRG on the further development of the injury question module.

Members of both SIPP and the CATI TRG joined the discussion list although actual participation was limited. In an opening post to the group, NISU outlined a number of possible approaches to further module development and the pros and cons of each approach. These were as follows:

(1) Key indicator questions

Pros Indicator questions would have a wide applicability or coverage across different injury areas allowing a small question set to provide information on a large number of topics.

Cons Unfortunately, valid indicators for injury do not appear to exist, to our knowledge at least.

(2) Exposure questions

Example: 'Do you have smoke detectors in your home?'

Pros Questions relating to exposure would complement existing injury data sources.

Cons Limitations on the size of question sets may reduce the utility of exposure-related questions—may only be applicable to a small number of topics.

(3) Incidence questions

Example: 'Have you had an injury which required medical treatment in the last 4 weeks?'

Pros Incidence questions would be suitable for a small question set.

Incidence questions are widely used and validated.

Incidence questions have the potential to provide information on trends in low severity injury.

Cons Serious injuries occur too infrequently to adequately monitor using population surveys of a plausible sample size.

Incidence questions would replicate existing data, at least for serious injury.

(4) Attitudes / knowledge questions

Example: 'To what extent do you agree with the statement; most injuries are preventable?'

Pros The first goal of the new National Injury Prevention and Safety Promotion Plan is to achieve a positive safety culture. Items like these can help to monitor the status of public awareness and attitudes.

Attitudes/knowledge questions would complement existing injury data sources.

Cons To date, there has been little validation of questions relating to attitudes and awareness concerning injury.

(5) Mixed module from 1–4

Pros A mixed model would suit a variety of end-users of the data and could provide a wider scope/more utility than one particular approach.

Cons Given the set length limitations, a mixed module may not be feasible.

NISU invited IPPSIG members to comment on these and to add any of their own thoughts/approaches to the discussion. While several suggestions were made, the necessarily open-ended question format to ascertain beliefs and attitudes toward injury and safety, as required by injury prevention researchers, could not be reconciled with the CATI format (requiring parsimony and self-explanatory concepts) and the requirements of the NHDD. As a result, the group was unable to provide a more suitable injury question set for the next round of testing by the deadline in March 2005.

Discussion

After a lengthy consultation process, the issue of an injury CATI question module for population surveys which suits both the needs of injury prevention researchers and the CATI TRG is as yet unresolved. The lack of valid key indicator questions for injury has contributed to the difficulty in finalising a robust module for CATI surveys. Also, the CATI format was found not to be an optimal methodology for question sets addressing attitudinal issues or canvassing injury/safety concerns, as these types of questions generally require open-ended responses that are not easily categorised.

The stipulation of a very small set of closed-response questions for a topic as diverse as injury complicates adequate coverage by such a question set. Demonstrated here in the field testing of questions concerning falls in the elderly, the prevalence of recent non-trivial injury is low, resulting in low positive response proportions for questions focusing on injury experience of respondents. Questions focusing on exposure to injury risk factors can avoid this constraint, but risk factors are diverse, requiring numerous questions if adequate coverage of the topic is to be achieved. Question sets addressing injury risk and injury prevention knowledge and attitudes have the potential for adequate coverage in a small module, but questions such as these are currently outside the preferred scope of the CATI TRG.

Ideally, injury prevention researchers should work towards developing and validating key indicator questions like those which have been developed for chronic health issues. Age, sex and place of residence are known contributors to injury risk, but addressing these in a population survey would add little to our current knowledge. The level of physical activity undertaken is also a predictor of injury risk, but interacts with age in that younger people undertaking very high levels of exercise are at increased injury risk (Plugge et al. 2002) while exercise programs have been demonstrated to reduce injury (falls) risk in older people (Chang et al. 2004). Moreover, the field testing of questions concerning exercise/activity in older people demonstrates that the variety of responses provoked by a simple 'do you exercise / what type of exercise do you do?' question set is largely inappropriate for CATI surveys. In this particular case, increasing the response options to capture better data inordinately lengthens the survey but the alternative, generalising the questions and/or limiting the responses to a few key activities (as tested), decreases data utility. From the work conducted throughout the CATI injury module's development it has become apparent that addressing the lack of key indicator questions is a crucial task for injury (and population health) researchers. The creation and validation of key indicator questions would greatly simplify the production of a useful CATI injury module.

Safety behaviour questions have been validated through many studies both in Australia and overseas (Hooper et al. 2003, Public Health Division 2000b). While wording and conceptual issues were identified in the cognitive testing of the proposed injury module, these questions are essentially unproblematic both in terms of validity and reliability and are an important source of injury risk factor (exposure) information. Also, some evidence for the worthiness of simply conducting an injury survey as a method of improving peoples' safety behaviours can be found in the results of the field testing of the smoke detector questions—here respondents appear to have taken a message from their first interview and found out what type of detector they have and/or tested it. The safety implications of this type of behavioural response should

not be underestimated. The inclusion of questions such as these in a CATI injury module would go some way to producing a concise module which both fulfils data item constraints and provides useful data for injury prevention researchers.

At this stage, the proposed CATI injury module has been through both cognitive testing and field testing and the results of this process indicate that further work must be done to produce a valid, useful and practicable module. NISU hopes to continue work in this area having identified a number of gaps in our current injury surveillance methodologies which could provide important information to injury prevention researchers throughout the country. In particular, an important aspect of future work should be to identify key indicator questions for injury.

Opportunities to apply questions which testing has indicated work well must also be sought, with the current review of the ABS's health surveys (including the National Health Survey) being one possibility (see ABS 2005). Further, revision of the National Health Survey in particular, being a face-to-face interview, may provide an opportunity through which to collect the attitudinal questions which did not work well in the CATI format. Also, the inclusion of such questions may be possible in one of more of the surveys conducted by or on behalf of several state health departments.

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Appendix A—Injury questions/concepts suggested for testing in the cognitive laboratory, from (Bradley and Harrison 2004)

In conjunction with Su Gruzin of the Public Health Information Development Unit, the following submission was made regarding the questions and concepts which should be included in the cognitive testing phase of the development of the CATI injury module.

The input received from the following injury prevention experts was also greatly appreciated; Pam Albany (NSW Dept of Health), Kerry Smith (Commonwealth Department of Health and Ageing), Rod McClure (Qld Injury Prevention and Control Australia, School of Population Health, Queensland University) and Carolyn Coggan (NZ Injury Prevention Research Centre, University Auckland).

Current injury surveillance systems provide reasonable estimates of the incidence of more serious injuries. However, information on risk factors for injury and on population awareness, knowledge and attitudes to injury generally, and to preventable injury in particular, is lacking. State CATI health surveys and monitoring may be best suited to providing information on these aspects of injury (rather than on incidence). Population knowledge of and attitudes to injury prevention, exposure to risk factors, and associated social variables may be more usefully explored through CATI, for use in the development of prevention programs, the evaluation of injury prevention interventions, and in setting injury prevention priorities.

For instance, after a recent CATI survey on preventable injuries in New Zealand, injury specialists asked, since most respondents believe that injuries are preventable and their homes are safe, why are injury rates in New Zealand so high? (Injury Prevention Research Centre 2003)

The intention ultimately would be to test questions applicable to the general population, to elicit their knowledge, awareness and attitudes to injury prevention (for instance, the preventability of injuries generally, assessment of the safety of homes and surroundings generally, and in relation to specifics—smoke alarms, storage of poisons, non-slip surfaces, etc).

Falls in the Elderly, 75+

Falls in the elderly is a specified priority topic of the National Injury Prevention Plan 2000–2003 (Commonwealth Department of Health and Aged Care, 2001). It is also suggested that the elderly aged 75+ be a priority population in the upcoming National Injury Prevention Plan (Pointer et al., 2003). This suggested priority population addresses both the issue of shifting population demographics with the restriction of the 75+ age category and allows for wider injury prevention initiatives for this age group with its population-based approach, while still allowing for the continuation of work initiated under the current falls prevention priority. The following questions concerning knowledge and attitudes regarding falls in the elderly are based on similar questions included in the New South Wales Older People's Health Survey 1999 (Public Health Division 2000a). These questions are aimed at establishing both the current

levels of exercise participation in the elderly population as well as the preparedness of people to participate in future falls prevention exercise programs.

The intention in cognitive testing would be to ensure that the question flow in the module is effective, that the response categories provided are appropriate, and that the 'if costs were kept low' concept expressed in question (B) is comprehended by respondents.

Although the target population is described above as 75+ it would be useful to test the questions on, say 60+ or any other age range that was convenient for testing purposes.

Question source: NSW Older People's Health Survey 1999

(A) Regular exercise has been shown to help reduce falls. Do you currently undertake any form of exercise?

1) Yes, question continues below
2) No, next question (B)
3) Don't know
4) Refused

If yes, what type of exercise do you do? (Multiple Response)

1) Walking
2) Exercises at home
3) Exercises in a group
4) Swimming
5) Dancing
6) Any other exercise? (specify) _____

If yes, how often do you do this exercise?

1) Less than once a week
2) One to two days a week
3) Three to six days a week
4) Daily

(B) Would you consider doing a program of exercise, or increasing your current level of exercise, particularly if costs were kept low?

1) Yes question continues below
2) No
3) Don't know
4) Refused

If yes, would you consider: (Multiple Response)

1) Walking
2) Exercises at home
3) Exercises in a group
4) Swimming
5) Dancing
6) Any other exercise? (specify) _____

General attitudes regarding safety and injury

The following questions concern broad-scale attitudes regarding injury in the general population. Based on questions developed and utilised in a recent New Zealand CATI survey (Hooper et al., 2003), these questions address the beliefs held regarding safety and injury preventability with a view to contributing to the development and refinement of current injury prevention programs. It is suggested that these, or similarly worded, questions be considered for inclusion in state CATI health surveys. Importantly, the questions must be couched in terms of safety from injury rather than safety per se, in order to avoid undue attention on the threat of interpersonal violence or criminal acts as threats to safety.

The intention in cognitive testing would be to test the general comprehension of the concepts expressed (safe from injury in your home/neighbourhood); to determine the amount of definitional assistance or prompts required for interviewers; and to gain some information on the main causes of concern expressed by respondents (with the possibility of establishing (some) pre-coded responses).

(A) To what extent do you believe that you are safe from injury in your home?

1) Very safe
2) Reasonable safe
3) Needs improving
4) Very unsafe
5) Don't know
6) Refused

(B) What is your main cause of concern regarding your safety from injury in your home?

(Specify) _____

(C) To what extent do you believe that you are safe from injury in your neighbourhood?

1) Very safe
2) Reasonable safe
3) Needs improving
4) Very unsafe
5) Don't know
6) Refused

(D) What is your main cause of concern regarding your safety from injury in your neighbourhood?

(Specify) _____

Of note, strong trends were detected in the New Zealand study in relation to the socioeconomic status of the respondent household (Hooper et al., 2003). As most State CATI health surveys include collection of household income data in demographic modules, comparable analyses to the New Zealand study could be undertaken.

Safety practices in the home

The Hooper et al. study (2003) included several questions relating to safety practices in the home, allowing the relationship between attitudes (see above) and actual practice to be explored. A significant linear trend was noted, the proportion of households with the safety feature increasing as the reported safety rating of the home increased (Hooper et al. 2003). Questions that were not restricted to respondents who were parents of small children are paraphrased below.

The intention in cognitive testing would be to test the general comprehension of the concepts expressed (non-slip mats, safety glass, etc); to determine any definitional assistance and/or prompts required for interviewers; to gain interviewer and respondent views on whether the item list holds the attention of respondents; and to gain information on the workability of the suggested forms of the questions on smoke alarms and hot water temperature.

(Responses: Yes / No / Don't know / Refused)

(A) Do you have a first aid kit?

(B) Do you use non-slip mats in the shower or bath?

(C) Are there handrails or grab bars where necessary for older people?

(D) Do you have safety strips or safety glass in your windows and glass doors?

(E) Do you have barriers or guards for heaters or fires?

This study also asked respondents whether or not they had a working smoke alarm in their homes. It is suggested that a more valid way of addressing this issue is to ask respondents about the testing of their smoke alarms. For example, the US Behavioral Risk Factor Surveillance System included the following question in 2000 (CDC, 2002);

- When was the last time you or someone else deliberately tested all of the smoke detectors in your home?
    1) Within the past month
    2) Within the past 6 months
    3) Within the past year
    4) One or more years ago
    5) Never
    6) No smoke detectors in home
    7) Don't know or not sure
    8) Refused

The New Zealand study also asked whether respondents kept their hot water at 55^{o}C or below. It is suggested that this question may require information that few people may know and that it may be preferable to ask such a question in the following form;

- Can you adjust your hot water system to lower the temperature of the flow?
    1) Yes
    2) No
    3) Don't know
    4) Refused

Injury preventability beliefs

The New Zealand survey (Hooper et al. 2003) opened with an extremely general question regarding injury preventability. Previous studies have reported that most people believe that injuries are largely unpreventable, a belief which must be addressed in order to establish effective injury prevention programs (Hooper et al. 2003). As such, the survey asked;

- To what extent do you agree with the statement; most injuries are preventable?
    1) Strongly agree
    2) Agree
    3) Neither agree or disagree
    4) Disagree
    5) Strongly disagree

The above question may also be extended to include specific types of injury, for example; 'most sporting injuries are preventable' or 'most injuries sustained through violence are preventable'. Interestingly, Hooper et. al. (2003) found that most New

Zealanders believed that injuries were largely preventable, in opposition to the previous research reported. While information on this issue may prove more unwieldy to utilise than other safety topics, such data may provide a good starting point for the discussion of effective safety communication strategies.

The intention in cognitive testing would be to ascertain the diversity of responses and acceptability (to interviewers and respondents) of the belief statement/s.

Alcohol and injury

One further suggestion is for Australian CATI health surveys to include questions on alcohol and injury. We emphasise the need for questions relating to alcohol consumption with relevance to risk taking / potentially injurious behaviour. The consumption of alcohol is an established risk factor for injury (Driscoll et al. 2003, McLeod et al. 2000, Steenkamp et al, 2002), particularly consumption in the short-term and binge drinking.

It is suggested that questions included in the CATI Alcohol module be phrased such that mean number of drinks consumed per episode is quantifiable, allowing for an approximation of binge-drinking behaviour.

It is also suggested that a question relating to the beliefs and attitudes regarding alcohol use and injury, possibly alcohol consumption's contribution to occasions of inter-personal violence, be included within the CATI Injury module.

Appendix B—Injury questions tested during ABS cognitive testing phase.

Falls in the elderly

Question 1: Do you currently undertake any form of exercise?

Question 2: If yes, what type of exercise do you do?

Question 3: If yes, how often do you do this exercise?

Question 4: Would you consider doing a program of exercise, or increasing your current level of exercise, particularly if costs were kept low?

General attitudes regarding safety and injury

Version A

Question 1: To what extent do you believe that you are safe from injury in your home?

Question 2: What is your main cause of concern for your safety from injury in your home?

Question 3: To what extent do you believe that you are safe from injury in your neighbourhood?

Question 4: What is your main cause of concern regarding your safety from injury in your neighbourhood?

Version B

Question 1: To what extent do you believe that you are safe from injury in your home? Do you believe that you are very safe, reasonably safe, needs improving or very unsafe?

Question 2: What is your main cause of concern for your safety from injury in your home?

Question 3: To what extent do you believe that you are safe from injury in your neighbourhood? Do you believe that you are very safe, reasonably safe, needs improving or very unsafe?

Question 4: What is your main cause of concern regarding your safety from injury in your neighbourhood?

Safety practices in the home

Question 1: Do you have a first aid kit?

Question 2: Do you use non-slip mats in the shower or bath?

Question 3: Are there handrails or grab bars where necessary?

Question 4: Do you have safety strips or safety glass in your windows and glass doors?

Question 5: Do you have barriers or guards for heaters or fires?

Question 6: When was the last time you or someone else deliberately tested all of the smoke detectors in your home?

Question 7: Can you adjust your hot water system to lower the temperature of the water?

Injury preventability beliefs

Version A

Question 1: To what extent do you agree with the statement; most injuries are preventable?

Version B

Question 1: To what extent do you agree with the statement; most injuries are preventable? Do you strongly agree, agree, disagree or strongly disagree?

Version C

Question 1: To what extent do you agree with the statement; most injuries are preventable? Do you strongly agree, agree, neither agree nor disagree, disagree or strongly disagree?

Alcohol and Injury

Question 1: I am now going to ask you about recent injuries.

Any time in the last 4 weeks (month) have you had any accidents, hurt yourself or been hurt by someone or something?

Question 2: Were you under the influence of alcohol, or any other substance, when you were injured?

Appendix C—Injury questions applied in field testing

Safety practices in the home

INJ17: Do you have smoke detectors in your home?

1. Yes
2. No
3. Don't know
4. Refused

INJ17b: What type of smoke detector do you have in your home?

1. Battery operated
2. Wired into electrical system
3. Don't know
4. Refused

INJ18: When was the last time you or someone else deliberately tested all of the smoke detectors in your home?

1. Within the last month
2. Within the past 6 months
3. Within the past year
4. One or more years ago
5. Never
6. Don’t know
7. Refused

INJ35: Do you have a first aid kit?

1. Yes
2. No
3. Don't know
4. Refused

INJ36: Do you have supplies of bandages, bandaids, antiseptic or other first aid equipment in your home?

1. Yes
2. No
3. Don't know
4. Refused

Physical activity

The following question was inserted into the main NSW Health Survey in the second quarter. It was tested against the Active Australia physical activity question module.

PHYS2: How active are you?

1. Very active
2. Active
3. Not active
4. Don’t know
5. Refused

Injury–falls in the elderly

(Asked of people 65 years and over)

INJ22: In the last 12 months have you had a fall?

1. Yes
2. No
3. Don't know
4. Refused

INJ23: How many times did you fall in the last 12 months?

1. Once
2. Twice
3. Three times or more
4. Don't know
5. Refused

INJ24: In the last 12 months have you had a fall which required medical treatment for injuries?

1. Yes
2. No
3. Don't know
4. Refused

INJ25: Were you ADMITTED to hospital as a result of any of your falls in the last 12 months?

1. Yes
2. No
3. Don't know
4. Refused

INJ26: Do you currently undertake any form of exercise?

1. Yes
2. No
3. Don't know
4. Refused

INJ26b: Do you usually undertake any form of exercise?

1. Yes
2. No
3. Don't know
4. Refused

INJ27: What type of exercise do you do?

(Multiple response)

1. Walking
2. Exercises at home
3. Exercises in a group
4. Swimming
5. Dancing
6. Other (Specify)
7. Don't know
8. Refused

INJ28: How often do you do this (from question above) exercise?

_____Record number of times per day

_____Record number of times per week

_____Less than once a week

Don't know

Refused

INJ34: What is the reason you did not participate in any exercise?

1. Ill health
2. Not interested
3. No appropriate activities in my area
4. Activities which exist are too expensive
5. No transport to reach activities
6. Too busy
7. Other (Specify)
8. Don't know
9. Refused