Foreword

We are living in a time where terrorist attacks regularly dominate news in all types of media and security measures, for instance at airports, have become very common. In Europe, worldwide terrorism has become a top policy agenda encompassing terrorism with the means of chemical, biological, radiological or nuclear (CBRN) weapons.

CBRN attacks are generally considered to be the most crucial and detrimental ones although most attacks use easier deliverable means and easy to produce chemicals or toxins. CBRN attacks have a wide potential to induce fear and anxiety in the society or in specific subgroups of the society. The reaction of the society can be very diverse to these future scenarios. Many measures have become very common in daily lives (for instance, airport queues, caused by security screening of bags). However, although civilians seem to have become accustomed to common security measures, the fear in the general public reception after specific events has been demonstrated to be highly elevated. For this reason, risk communication is very crucial.

Policy must integrate the consideration of psychological and social effects of terrorism using CBRN. However, differential accesses are needed to study not only fear but potential behavioral reactions and how these might vary in specific subgroups of the population, for instance in the elderly or according to gender and educational backgrounds. The current book is focusing on these types of simulative scenarios in order to inform developers and policy-makers about meaningful strategies incorporating societal demands.

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Chapter 1

CBRN terrorism – a societal challenge

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Modern societies face a multitude of risks they strive to be prepared for. The management of conventional threats such as flooding, severe weather, financial crises, and industrial accidents are the responsibility of various authorities, public protection, and disaster relief organisations. In the last 15 years terrorism has been an ongoing and growing threat but many citizens are generally unconcerned by it. Every time an incident occurs terrorism temporarily becomes a topic of interest but is not a general issue for most citizens. Terrorism does not necessarily aim at the destruction of buildings or capabilities but primarily at *spreading fear* in society, often to promote a political agenda. Other important aspects of terrorism are seeking revenge, gaining attention, or make a statement of some sort. Large scale incidents, unconventional attacks and the targeting of prominent victims will make it easier for terrorists to get the attention they seek. For this reason terrorists are ultimately interested in tools to spread fear effectively. Weapons of mass destruction (WMD) are one of the ultimate threats modern societies can face. A terrorist attack is usually a localized event effecting citizens directly involved and nearby. In the case of Chemical, Biological, Radiological and Nuclear (CBRN) terrorism, however, there would be uncertainty and fear concerning the scale and nature of the effects and who may be affected by contaminations or the potentially deadly effects. Although the production of most types of WMD may be challenging for terrorists, rumours, hoaxes or the threat of using CBRN materials can cause massive distortions in modern societies; in particular, new media has become an important factor. Online platforms like twitter are able to spread news all over the globe within seconds. It is possible to bring any incident to the public's attention if a single individual has a smartphone ready to upload it to the internet.

Given the importance of information in modern societies, communicating about CBRN threats is as important for preparing and protecting citizens as decontamination or quarantine in the case of a severe incident. CBRN terrorism combines two important topics in crisis management - terrorism and hazardous materials (HAZMAT). The threat of CBRN terrorism shares similarities with both lines of civil protection but also presents unique challenges that spring from the specific interactions of both types of threat.

Successful communication in case of a CBRN incident depends on thorough preparation and consideration. All levels and stakeholders of civil protection should be part of a comprehensive communication strategy about CBRN terrorism. The focus of all communication strategies are the citizens who face a dangerous threat they know very little or nothing about. Citizens' need for information is large - too large to be addressed at the very moment an incident

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happens. For this reason thorough preparation of communication strategies are of great benefit in CBRN crisis situations. A comprehensive communication strategy for CBRN threats should address all phases of an incident: preparation, detection and warning, response and recovery.

Terrorism poses a particular challenge to modern societies since it has impact beyond the mere incident but also a political perspective. Especially if perpetrators have a foreign/differing background terrorism can become a huge societal issue despite the fact that probably only a limited number of people were affected in the first place. CBRN terrorism extends this view by the fact that suddenly everybody might become a victim. Many agents are not visible and could have delayed effects due to incubation time or severe after-effects. Even if an actual threat is rather small the perception of an CBRN incident is not since many concepts, popular in movies and media, which can be triggered very easily already exist in the general public: radiation, infections / flue, nerve agents etc.

This book features the outcomes of the communication group in the CATO project funded by the European Commission. The first section reports the findings of an international citizen survey on CBRN terrorism. The second and third parts feature a communication guide and a communication scorecard both meant for communication experts developing strategies for CBRN incidents. The communication guide provides an outline and assistance to develop comprehensive communication strategies. It takes into account specifics of the CBRN threat, terrorism, and the interaction of both phenomena. The scorecard allows assessing the status of present preparation for CBRN incidents. The guide and scorecard particularly aim at communication and interaction with the general public. Contrary to other stakeholders the general public is not well organised and very heterogeneous. Citizens often behave according to their own standards and plans rather than simply following instructions given to them by authorities. In particular, the rise of modern communication technologies has greatly empowered citizens in a crisis situation. Communication efforts during a CBRN crisis must feature a modern approach. Actively listening to public perceptions and responding with timely and effective communications is very important and much better than sending messages and “hoping for the best” then wondering why many people are not paying attention to directions.

The guide features six sections: General recommendations on crisis communication (I), terrorism (II) and specifically CBRN (III). CBRN is divided into a single section for each category. Individual and cultural differences are considered in an extra section (IV), the fifth part deals with specific channels used to disseminate information and interact with the general public (V). The final section includes phase specific recommendations and considerations (VI). The guide aims to provide experts in crisis communication with a tool they can use to develop in depth guidelines and standard operational procedures for the specific situations they face in their country and region. The *CBRN Crisis Communication Scorecard* allows a detailed assessment of preparations in response organisations. Preparations are divided between the contact with citizens and the contact with news media. It features a phase driven approach which includes all phases of crisis preparation – before, during, and after an incident.

The content of this book is meant to provide facts and tools to engage in the planning and generation of communication strategies and content in CBRN crises situations. It is recommended to use the tools together in an iterative process of assessment, planning, and reassessment of existing plans and strategies.

Chapter 2

CBRN terrorism – societal perspectives and attitudes

Daniela Knuth[2] and Dieter Rhode[3]

2.1 Introduction

This chapter reports findings of the CATO survey conducted by the University of Greifswald. Aim of the survey was to get insights on citizen's perceptions, concepts and actions in case of CBRN incidents. Extensive information was collected in several European countries and Israel to address emergency relevant knowledge and experiences, risk perception with respect to terror incidents in contrast to other catastrophes, institutional trust and specific information needs triggered by C, B, R, N or E scenarios.

Findings indicate a uniform perception of CBRN incidents in the general public in contrast to conventional terrorism. As expected, all CBRN incidents present a unique threat which elicits extreme fear and worry and related actions impulses but at the same time incidents are considered as very unlikely. This combination generates an extreme need for information in case of an incident. Only little differentiation between the incidents is traceable for the general public due to a lack of a clear conceptual differentiation by citizens. Gender effects were found as well as effects by country. While gender effects show somewhat higher worry, concern and action tendencies for the female sample on a wide range of questions, only few overall effects were found for country specific incidents. This indicates a rather similar perception of CBRN incidents, related recommendations and actions.

2.2 Method

The study is based on the results of a large online survey which was developed by the EMAUG team on the basis of a literature review. Several studies concerning the challenges of CBRN events (McCreary, 1993; Wilson, 2000) gave important input. The key topics of the literature review were CBRN(E) related communication and non-communications behaviours as well as a number of different constructs which have been found to influence these aspects. Before the final survey was launched, questions were pre-tested in order to validate its feasibility as well as the item-difficulty and their corresponding answer options.

Cognitive Debriefings

Based on the review of literature a pilot-questionnaire was developed and then tested in a cognitive debriefing task with 15 participants. The questionnaire

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was filled out by each participant and afterwards discussed with a member of the team. Each question was reviewed concerning possible difficulties in understanding and responding. The comments were incorporated in the final version of the survey.

Data protection and informed consent

Participants received detailed information prior to the start of the study on its contents, design, meaning and aim as well as on the use of the data. Participants were informed that their participation in the project was entirely voluntary, financial or other incentives were not included. The participants were allowed to ask questions about the study and to withdraw at any time, without giving a reason. Their consent was explicitly requested. All data will be anonymous when disseminated in reports and articles; conclusions to individuals will not be possible to draw. The collected data contain only information which does not allow conclusions to individuals. Ethical approval for the study was received by the University of Greifswald on May 30th 2012.

Inclusion criteria and sample

The target group of this survey was the general population. In order to be eligible for the study, participants had to be at least 18 years of age. There were no further restrictions to the sample. A total sample size of approximately 200 participants for each scenario was aimed and also achieved. A total of 1294 participants completed the survey with 267 participants responding to the scenario concerning terrorism with radiological agents, 269 participants concerning terrorism with chemicals, 251 participants concerning terrorism with biological materials, 255 participants concerning terrorism with nuclear materials and 252 participants concerning conventional terrorism. The largest portion of the sample is coming from Germany (N=1028). The other samples are considerably smaller (United Kingdom N=115; Netherlands N=51; Spain N=21; Israel N=14 and others N=65).

Recruitment

The goal of recruitment was to reach as many participants as possible, especially social media and online advertisements have been used. Universities in Germany, the United Kingdom, Spain, Israel and the Netherlands were contacted via email, social networks, e.g. Facebook, and other online communities. In this context, a short explanation of the project and its aims was provided as well as a direct link to the questionnaire. The online survey started on August 7th 2012 and until September 19th 2013 a total of 5631 people did click on the questionnaire and a total of 2926 people started the questionnaire. Participants needed a mean time of about 41 minutes to complete the questionnaire.

Data Analysis

Data were gathered for separate C, B, R and N scenarios and compared to conventional terror using explosives. The study will allow to compare people coming from different countries with regard to CBRNE incidents as well as individual and group based differences such as gender, age, family status, personal self-efficacy, resilience, personality traits and attitudes concerning illness

behaviour. This document will give detailed insight concerning the different parts of the questionnaire.

Data analyses were made using the statistical analyses software SPSS 19.0. Analyses of variance, t-tests and chi^2 tests were conducted in order to reveal differences between groups (gender, country, scenario type). The appropriate effect sizes were calculated.

Topics

The first section of the questionnaire concerns socio demographic information of the participants, followed by personality and health items, risk perception and preparedness. After that the randomly assignment to one of the CBRNE scenarios followed with specific questions concerning communication, information needs as well as most likely behaviours in such an event (see Figure 1).

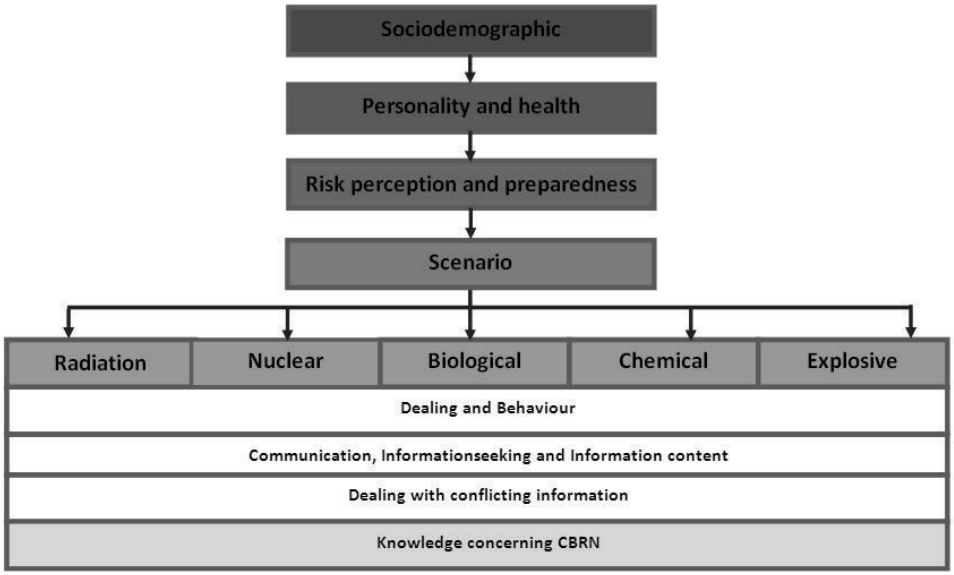


Figure 1 Design of the CATO field study survey

2.3 Demographic Variables

Table 1 displays the socio-demographic information of the final sample of 1294 participants. The great majority of almost 80% currently lives in Germany. The sample can be described as a student sample since they are very highly educated and about 82% currently consider themselves as being in training or studying. The mean age of 25.10 years (*SD*=6.99) also supports this assumption. The gender distribution ($\chi^2(2)=0.09$, p=.955, $\varphi=.01$) as well as the percentage of people with grandchildren ($\chi^2(2)=5.28$, p=.071, $\varphi=.25$), volunteers ($\chi^2(2)=1.42$, p=.491, $\varphi=.03$), people who are not working, e.g. housewife/-man ($\chi^2(2)=3.34$, p=.188, $\varphi=.05$) is comparable between the different countries. In all other variables, there is a significant variation between the countries of current residence.

Table 1 Demographic Variables of Sample Population (N= 1294).

			Country of current residence													
	Total		Germany		GB/ Northern Ireland		Netherlands		Spain		Israel		USA		Others	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Total	1294	100	1028	79.4	115	8.9	51	3.9	21	1.6	14	1.1	5	.4	60	4.6
Gender																
Male	534	41.3	425	41.3	46	40.0	21	41.2	8	38.1	10	71.4	3	60.0	21	35.0
Female	760	58.7	603	58.7	69	60.0	30	58.8	13	61.9	4	28.6	2	40.0	39	65.0
Age																
18 - 24	798	61.7	655	63.7	81	70.4	22	43.1	9	42.9	3	21.4	0	0.0	28	46.7
25 - 30	323	25	275	26.8	11	9.6	7	13.7	6	28.6	8	57.1	1	20.0	15	25.0
31 - 40	109	8.4	69	6.7	10	8.7	11	21.6	6	28.6	2	14.3	3	60.0	8	13.3
41 - 65	64	4.9	29	2.8	13	11.3	11	21.6	0	0.0	1	7.1	1	20.0	9	15.0
Relationship Status																
Single	619	47.8	486	47.3	62	53.9	20	39.2	12	57.1	7	50.0	1	20.0	31	51.7
In a relationship	562	43.4	62	6.0	10	8.7	15	29.4	0	0.0	3	21.4	2	40.0	7	11.7
Married	99	7.7	476	46.3	38	33.0	16	31.4	8	38.1	4	28.6	1	20.0	19	31.7
Divorced or separated	11	.9	3	.3	4	3.5	0	0.0	0	0.0	0	0.0	1	20.0	3	5.0
Widowed	3	.2	1	.1	1	.9	0	0.0	1	4.8	0	0.0	0	0.0	0	0.0
Children	88	6.8	49	4.8	13	11.3	12	23.5	1	4.8	2	14.3	1	20.0	10	16.7
Grandchildren	7	.5	1	2.0	2	15.4	2	16.7	1	100	0	0.0	0	0.0	1	10.0
Education																
No qualification primary school (4 years)	1	.1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	1.7
Lowest formal qualification (8/9 classes)	8	.6	3	.3	0	0.0	2	3.9	1	4.8	0	0.0	0	0.0	2	3.3

Table 1 continued; *Demographic Variables of Sample Population (N= 1294).*

	Total		Country of current residence													
			Germany		GB/ Northern Ireland		Netherlands		Spain		Israel		USA		Others	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Intermediary secondary qualification (10 classes)	25	1.9	21	2.0	1	.9	1	2.0	0	0.0	0	0.0	0	0.0	2	3.3
Higher secondary education qualification (11/12/13 classes)	864	66.8	738	71.9	79	68.7	20	39.2	5	23.8	2	14.3	1	20.0	19	31.7
University degree qualification	395	30.5	265	25.8	35	30.4	28	54.9	15	71.4	12	85.7	4	80.0	36	60.0
Occupation																
Employed	252	19.5	163	15.8	29	25.2	21	41.2	4	19.0	10	71.4	2	40.0	23	38.3
Training/studying	1066	82.4	904	87.9	82	71.3	25	49.0	12	57.1	6	42.9	2	40.0	35	58.3
Volunteer	68	5.3	51	4.9	6	5.2	6	11.8	0	0.0	1	7.1	0	0.0	4	6.6
Retired	5	0.4	1	0.0	1	.8	1	1.9	0	0.0	0	0.0	0	0.0	2	3.3
Self-employed	63	4.9	41	3.9	4	3.5	7	13.7	1	4.8	5	35.7	0	0.0	5	8.3
Not working, e.g. housewife/-man	12	0.9	7	.6	2	1.7	1	1.9	0	0.0	0	0.0	1	20.0	1	1.6
Unemployed	36	2.8	15	1.4	10	8.7	1	1.9	5	23.8	1	7.1	2	40.0	2	3.3
Permanently incapacitated	3	0.2	1	0.0	0	0.0	0	0.0	1	4.8	0	0.0	0	0.0	1	1.6
People in town																
till 5.000	77	6.0	55	5.4	11	9.6	2	3.9	3	14.3	1	7.1	0	0.0	5	8.3
till 20.000	108	8.3	75	7.3	18	15.7	5	9.8	1	4.8	1	7.1	0	0.0	8	13.3
till 100.000	563	43.5	515	50.1	17	14.8	12	23.5	5	23.8	4	28.6	2	40.0	8	13.3
till 300.000	236	18.2	178	17.3	29	25.2	13	25.5	3	14.3	6	42.9	1	20.0	6	10.0
till 1.000.000	177	13.7	130	12.6	21	18.3	16	31.4	2	9.5	1	7.1	0	0.0	7	11.7
more than 1.000.000	133	10.3	75	7.3	19	16.5	3	5.9	7	33.3	1	7.1	2	40.0	26	43.3

Health and individual aspects

Table 2 displays further individual characteristics of the present sample. With a mean value between 4 (good) and 5 (very good) for general and mental health, the sample is quite healthy. Although the difference between men and women is statistically significant for general health ($F(1,1292)=26.10$, $p<.001$, $\eta=.14$) and mental health ($F(1,1292)=40.43$, $p<.001$, $\eta=.17$), there is only a small effect for the health differences. There are no differences with respect to resilience ($F(1,1292)=0.00$, $p=.968$, $\eta=.00$) between men and women. Differences were found for extraversion ($F(1,1292)=15.52$, $p<.001$, $\eta=.11$), agreeableness ($F(1,1292)=27.47$, $p<.001$, $\eta=.14$), conscientiousness ($F(1,1292)=20.77$, $p<.001$, $\eta=.13$), neuroticism ($F(1,1292)=3.99$, $p<.05$, $\eta=.06$), openness ($F(1,1292)=15.80$, $p<.001$, $\eta=.11$), compassion ($F(1,1292)=92.96$, $p<.001$, $\eta=.26$), self-efficacy ($F(1,1292)=43.66$, $p<.001$, $\eta=.18$) and illness anxiety ($F(1,1292)=67.93$, $p<.001$, $\eta=.22$). With the exception of a medium effect in compassion between men and women, all other difference reached only a small effect or even no effect at all (neuroticism and resilience). In general it can be summarised that men and women are quite comparable and women are more compassionate with respect to other people.

Table 2 Health and personality variables of sample population (N= 1294).

	Total	Male N = 534	Female N = 760
	M (SD)	M (SD)	M (SD)
General and psychological health evaluation (1= *very poor*, 6= *excellent*)			
General health during last 4 weeks	4.54 (0.99)	4.70 (1.02)	4.42 (0.96)
Mental health during last 4 weeks	4.39 (1.13)	4.63 (1.18)	4.23 (1.06)
Resilience Scale (1= *disagree strongly*, 5 = agree strongly)			
Resilience	4.00 (0.47)	4.00 (0.49)	4.00 (0.46)
Big Five Short Scale (1= disagree strongly, 5 = agree strongly)			
Extraversion	3.22 (0.95)	3.10 (0.95)	3.31 (0.95)
Agreeableness	3.81 (0.68)	3.69 (0.71)	3.90 (0.65)
Conscientiousness	3.35 (0.75)	3.24 (0.78)	3.43 (0.73)
Neuroticism	3.11 (0.58)	3.14 (0.60)	3.08 (0.56)
Openness	3.68 (0.90)	3.56 (0.92)	3.76 (0.87)
Compassion Scale (1= Not at all true of me, 5 = very true of me)			
Compassion	3.47 (0.86)	3.20 (0.89)	3.65 (0.79)
Self- Efficacy Scale (1= Not at all true , 4 = exactly true)			
Self- efficacy	2.98 (0.44)	3.080.43	2.92 (0.43)
Illness- Attitude Scale (1= no, 5= most of the time)			
Illness anxiety	2.14 (0.66)	1.970.61	2.27 (0.66)

Note. Values are mean scores on general and psychological health evaluation (1= *very poor*, 6= *excellent*), Resilience Scale (1= *disagree strongly*, 5 = agree strongly), Big Five Short Scale (1= disagree strongly, 5 = agree strongly) , Compassion Scale (1= Not at all true of me, 5 = very true of me), Self- Efficacy Scale (1= Not at all true , 4 = exactly true), Illness- Attitude Scale (1= no, 5= most of the time).

In order to investigate communication during CBRN terrorist events and especially the usage of different means of media it is important to assess what types of media are usually preferred in everyday life. Results shown in Table 3 indicate that especially online media (internet news and social media) are used most intensively in everyday life. After that, the more "conventional" types of media are used by this sample (TV news, radio, newspapers). The usage of apps, sms notifications and information from other local residents is used on rare occasions, whereas the mean value for the use of information hotlines that this type of information media is not used at all.

Table 3 How intensively do you use each of the following media in your daily life? (N= 1294).

Media	M (SD)
Internet news	3.70 (1.11)
Social media	3.63 (1.37)
TV news	2.93 (1.19)
Radio	2.69 (1.25)
Newspapers	2.60 (1.14)
Apps	1.86 (1.25)
SMS notifications	1.68 (1.17)
Information hotline	1.09 (0.38)
Information from local residents	2.06 (1.06)

Note. Values are mean scores on a 5- point scale (1= *not at all*, 5= *extremely*).

Scenarios

The CATO field study included a specific part in which a scenario (C, B, R, N or E) was introduced and each participant was randomly assigned to one of the five scenarios. All communication related questions were posed in relation to the specific scenario. Table 4 displays the socio demographic information of the subsamples with respect to the different scenarios. The scenarios were carefully designed to ensure inter-comparability for each type of threat and the subsamples are comparable regarding gender, relationship status and education.

Table 4 Assignment of scenarios to sample population (N= 1294).

	Scenario										X^2 *(df)*
	Radiological		Chemical		Biological		Nuclear		Conventional (E)		
	N	%	N	%	N	%	N	%	N	%	
Total	267	100	269	100	251	100	255	100	252	100	
Gender											2.59 (4)
Male	106	39.7	117	43.5	95	37.8	111	43.5	105	41.7	
Female	161	60.3	152	56.5	156	62.2	144	56.5	147	58.3	
Relationship											21.38 (16)
Single	125	46.8	143	53.2	128	51.0	120	47.1	103	40.9	
In a relationship	20	7.5	19	7.1	15	6.0	24	9.4	21	8.3	
Married	119	44.6	106	39.4	105	41.8	111	43.5	121	48.0	
Divorced or separated	2	.7	1	.4	2	.8	0	0.0	6	2.4	
Widowed	1	.4	0	0.0	1	.4	0	0.0	1	.4	
Education											23.03 (16)
No qualification primary school	0	0.0	0	0.0	1	.4	0	0.0	0	0.0	
Lowest formal qualification	3	1.1	0	0.0	1	1.2	0	0.0	4	1.6	
Intermediary secondary qualification	6	2.2	4	1.5	3	67.7	8	3.1	4	1.6	
Higher secondary education qualification	175	65.5	197	73.5	170	30.3	166	65.1	156	61.9	
University degree qualification	83	31.1	67	25.0	76	0.7	81	31.8	88	34.9	

Note. *p<.05; **p<.01; ***p<.001

2.4 Emergency relevant experience and knowledge

Since prior emergency experience can be an important factor when looking at future behaviour and preparedness activities, the number of experienced critical incidents (e.g. serious illness or injury (self or family), loss of job/income, bereavement) as well as the experience of an emergency event (e.g. flood, earthquake, traffic accident, medical emergency, fire etc.) was assessed as well (see Table 5). In total only 9% of the sample has no experience at all concerning critical incidents. About three-fourths (74.3%) on the other hand had experienced at least two critical incidents in the past. The experience of emergency events was also very common since more than half of the sample (58%) has experienced at least one emergency event in the past. Asked how well they think they coped in this situation, most people perceived their coping as being moderately or even quite a bit well (Table 6).

Table 5 Number of critical life events and emergency emergency experience (N= 1.294).

	N	%
Number of critical life events	1294	100
none	117	9.0
one	215	16.6
two or three	581	44.9
four or more	381	29.4
Experienced emergency	1294	100
yes	750	58.0
no	544	42.0

Table 6 Perceived coping of people with experience (N=750).

	M (SD)	N	%
Self-rated coping	3.68 (0.76)		
not at all well		12	1.60
a little bit well		43	5.73
moderately		173	23.07
quite a bit well		468	62.40
extremely well		54	7.20

In order to find out how much people already know concerning emergency events, they were also asked about their perceived emergency knowledge (see Table 7). Most knowledge is perceived with respect to first aid, fire drills at school and from reading safety notices/evacuation plans in public places, such as in hotel rooms, train carriages, etc. In general there is only a little professional knowledge.

Table 7 Perceived emergency knowledge (N= 1294).

Emergency knowledge Scale	M (SD)
I have professional knowledge, gained from working for the emergency services.	1.58 (1.09)
I have first aid knowledge, gained from a first aid course.	3.28 (1.20)
I have fire safety knowledge. (e.g. gained from being a warden/fire safety officer).	1.56 (1.02)
I have taken part in fire drills at school.	2.93 (1.36)
I have taken part in fire drills at work.	1.91 (1.34)
I have read safety notices/evacuation plans in public places, such as in hotel rooms, train carriages, etc.	2.84 (1.28)
I have thought about what would happen if an emergency occurred in such a location and had prepared my own evacuation plan.	2.11 (1.28)

Note. Values are mean scores on a 5- point scale (1= *not at all*, 5= *extremely*)

Figure 2 displays the response to two emergency knowledge items in more detail. Almost half of the entire sample has no emergency relevant knowledge gained by preparing an own evacuation plan. The other half on the other hand has at least thought a little bit about an own evacuation plan. Safety notices and evacuation plans are read quite a lot since more than half of the sample (59.4%) rated their perceived emergency knowledge as being at least moderately.

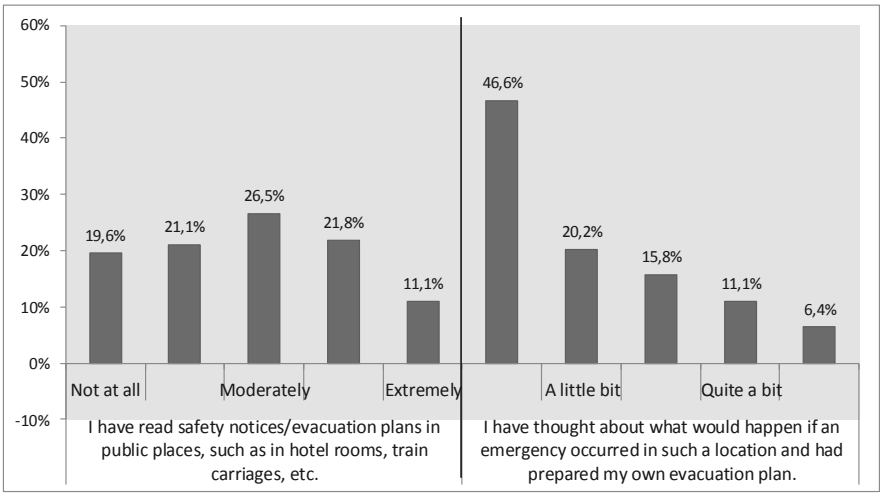


Figure 2 Perceived emergency knowledge (N = 1294).

Since the focus of CATO are CBRN events the participants were further asked concerning their general interest in receiving information on how to behave during a CBRN event and if they would also consider this information (see Table 8). A mean value of about three concerning interest in and consideration of information displays a moderate level. Only 7% have no interest at all in receiving information concerning CBRN events. The majority is at least a little bit interested and would also consider the information given (see Figure 3).

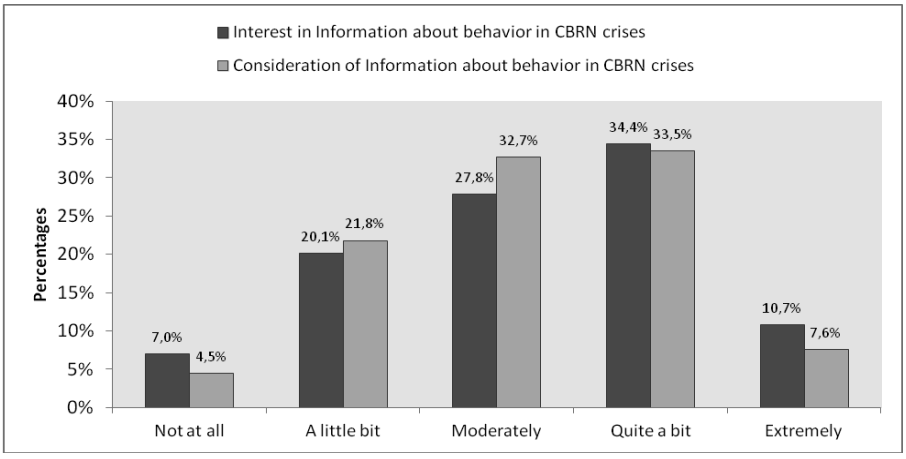


Figure 3 Rate of interest in and consideration of Information about behaviour in CBRN crises (N = 1294).

In order to find out what people already know or how they perceive their knowledge concerning CBRN materials the participants were asked to rate their knowledge on a scale from 1=not existent to 5= extensive (Table 8). The mean knowledge is in the total sample between 2 (a little bit) and 3 (moderately). Interestingly, women rate their knowledge lower than men. For knowledge concerning radiological and nuclear materials this difference reaches a medium effect. Therefore, a nuclear or radiological event might induce more uncertainty in women since they perceive themselves as having less knowledge. The level of perceived knowledge in the different countries is comparable since the differences represent only small effects.

Table 8 Interest, consideration and perceived knowledge concerning CBRN (N= 1294).

	Total	Gender		Country of current residence		
		Male N=534	Female N=760	Germany N=1028	UK N=115	Others N=151
Interest in CBRN information[a]	3.22 (1.09)	3.13 (1.15)	3.28 (1.06)	3.24 (1.07)	3.05 (1.28)	3.20 (3.28)
Consideration of CBRN information[a]	3.18 (1.00)	3.11 (1.05)	3.23 (0.97)	3.18 (0.98)	3.07 (1.12)	1.13 (1.03)
Level of knowledge about radiological and nuclear materials[b]	2.87 (0.96)	3.21 (0.97)	2.63 (0.88)	2.96 (0.92)	2.47 (0.96)	2.54 (1.08)
Level of knowledge about biological materials[b]	2.67 (0.99)	2.87 (1.00)	2.54 (0.96)	2.74 (0.96)	2.33 (1.01)	2.52 (1.12)
Level of knowledge about chemical materials[b]	2.60 (1.00)	2.89 (1.05)	2.41 (0.91)	2.65 (0.98)	2.30 (1.02)	2.52 (1.08)

Note. [a] Values are mean scores on a 5- point scale (1= *not at all interested/ consider it*. 5= *extremely interested/ consider it*); [b]Values are mean scores on a 5- point scale (1= not existent. 5= extensive).

Looking at the answers to the questions in Table 9, Table 10, Table 11 regarding radiological and nuclear, biological and chemical materials, only small effects for the differences between men and women as well as between the different countries of residence have been observed. That suggests that the objective knowledge concerning CBRN materials is quite comparable between these different groups. It is noticeable that especially the item "*It is advisable to seek shelter in basements"* produced a larger proportion of people answering with "*I don´t know*" (20%-32%). This is especially true for chemical materials since each answer option comprises about one-third of the sample. This suggests that people are especially unsure if seeking shelter in the basement is the right behaviour in case of a chemical event. Although it is only a small effect, it is noticeable that about 68% of men think it is indeed advisable to seek shelter in the basement in case of a radiological or nuclear event whereas only 51% of the women do think so as well. The same is true concerning wearing a protective mask in case of exposure to radiological or nuclear materials. In the male sample about 64% stated that this would be advisable in contrast to only 48% in the female sample. These results suggest that women might be uncertain on how to protect themselves in case of such an event.

Table 9 Please rate the following statements for radiological and nuclear materials (N= 1294).

	Total		Gender				Country of current residence					
			Male N= 534		Female N= 760		Germany N= 1028		UK N= 115		Others N= 151	
Can be absorbed through the skin.												
Yes	1090	84.2	450	84.3	640	84.2	871	84.7	97	84.3	122	80.8
No	112	8.7	61	11.4	51	6.7	95	9.2	7	6.1	10	6.6
Don't know	91	7.0	22	4.1	69	9.1	62	6.0	10	8.7	19	12.6
Missing	1	.1	1	.2	0	0.0	0	0.0	1	.9	0	0.0
Can be absorbed through the air and food.												
Yes	1210	93.5	511	95.7	699	92.0	975	94.8	99	86.1	136	90.1
No	31	2.4	10	1.9	21	2.8	19	1.8	6	5.2	6	4.0
Don't know	52	4.0	12	2.2	40	5.3	34	3.3	9	7.8	9	6.0
Missing	1	.1	1	.2	0	0.0	0	0.0	1	.9	0	0.0
It is advisable to seek shelter in basements.												
Yes	755	58.3	365	68.4	390	51.3	609	59.2	74	64.3	72	47.7
No	275	21.3	101	18.9	174	22.9	214	20.8	21	18.3	40	26.5
Don't know	263	20.3	67	12.5	196	25.8	205	19.9	19	16.5	39	25.8
Missing	1	.1	1	.2	0	0.0	0	0.0	1	.9	0	0.0
It is advisable to wear a protective mask.												
Yes	704	54.4	343	64.2	361	47.5	561	54.6	64	55.7	79	52.3
No	398	30.8	142	26.6	256	33.7	324	31.5	31	27.0	43	28.5
Don't know	191	14.8	48	9.0	143	18.8	143	13.9	19	16.5	29	19.2
Missing	1	.1	1	.2	0	0.0	0	0.0	1	.9	0	0.0
A person-to-person spread is possible.												
Yes	428	33.1	178	33.3	250	32.9	351	34.1	32	27.8	45	29.8
No	640	49.5	298	55.8	342	45.0	513	49.9	57	49.6	70	46.4
Don't know	225	17.4	57	10.7	168	22.1	164	16.0	25	21.7	36	23.8
Missing	1	.1	1	.2	0	0.0	0	0.0	1	.9	0	0.0
Washing with water and soap can remediate contaminations caused by those materials.												
Yes	254	19.6	171	32.0	83	10.9	208	20.2	18	15.7	28	18.5
No	878	67.9	314	58.8	564	74.2	710	69.1	71	61.7	97	64.2
Don't know	161	12.4	48	9.0	113	14.9	110	10.7	25	21.7	26	17.2
Missing	1	.1	1	.2	0	0.0	0	0.0	1	.9	0	0.0
The distance to those materials has an impact on the extent of harm to one's body.												
Yes	1191	92.0	503	94.2	688	90.5	957	93.1	95	82.6	139	92.1
No	47	3.6	16	3.0	31	4.1	34	3.3	7	6.1	6	4.0
Don't know	55	4.3	14	2.6	41	5.4	37	3.6	12	10.4	6	4.0
Missing	1	.1	1	.2	0	0.0	0	0.0	1	.9	0	0.0
The length of time of exposure to these issues has an impact on the harm done to one's body.												
Yes	1236	95.5	519	97.2	717	94.3	987	96.0	108	93.9	141	93.4
No	26	2.0	6	1.1	20	2.6	19	1.8	3	2.6	4	2.6
Don't know	31	2.4	8	1.5	23	3.0	22	2.1	3	2.6	6	4.0
Missing	1	.1	1	.2	0	0.0	0	0.0	1	.9	0	0.0

Table 9 continued; *Please rate the following statements for radiological and nuclear materials (N= 1294).*

	Total		Gender				Country of current residence					
			Male N= 534		Female N= 760		Germany N= 1028		UK N= 115		Others N= 151	
A person exposed to these issues will inevitably have serious long term health problems.												
Yes	920	71.1	327	61.2	593	78.0	727	70.7	79	68.7	114	75.5
No	259	20.0	164	30.7	95	12.5	216	21.0	17	14.8	26	17.2
Don't know	115	8.9	43	8.1	72	9.5	85	8.3	19	16.5	11	7.3
Missing	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Note. Values are total scores and percentages for each option.

Table 10 Please rate the following statements for biological materials. (N= 1294).

	Total		Gender				Country of current residence					
			Male N= 534		Female N= 760		Germany N= 1028		UK N= 115		Others N= 151	
Can be absorbed through the skin.												
Yes	862	66.6	373	69.9	489	64.3	687	66.8	70	60.9	105	69.5
No	289	22.3	115	21.5	174	22.9	240	23.3	24	20.9	25	16.6
Don't know	142	11.0	45	8.4	97	12.8	101	9.8	20	17.4	21	13.9
Missing	1	.1	1	.2	0	0.0	0	0.0	1	.9	0	0.0
Can be absorbed through the air and food.												
Yes	1243	96.1	519	97.2	724	95.3	1007	98.0	98	85.2	138	91.4
No	15	1.2	7	1.3	8	1.1	8	.8	4	3.5	3	2.0
Don't know	35	2.7	7	1.3	28	3.7	13	1.3	12	10.4	10	6.6
Missing	1	.1	1	.2	0	0.0	0	0.0	1	.9	0	0.0
It is advisable to seek shelter in basements.												
Yes	337	26.0	145	27.2	192	25.3	257	25.0	38	33.0	42	27.8
No	537	41.5	241	45.1	296	38.9	444	43.2	37	32.2	56	37.1
Don't know	419	32.4	147	27.5	272	35.8	327	31.8	39	33.9	53	35.1
Missing	1	.1	1	.2	0	0.0	0	0.0	1	.9	0	0.0
It is advisable to wear a protective mask.												
Yes	1219	94.2	509	95.3	710	93.4	991	96.4	102	88.7	126	83.4
No	24	1.9	7	1.3	17	2.2	11	1.1	4	3.5	9	6.0
Don't know	50	3.9	17	3.2	33	4.3	26	2.5	8	7.0	16	10.6
Missing	1	.1	1	.2	0	0.0	0	0.0	1	.9	0	0.0
A person-to-person spread is possible.												
Yes	1203	93.0	503	94.2	700	92.1	987	96.0	98	85.2	118	78.1
No	26	2.0	10	1.9	16	2.1	13	1.3	3	2.6	10	6.6
Don't know	64	4.9	20	3.7	44	5.8	28	2.7	13	11.3	23	15.2
Missing	1	.1	1	.2	0	0.0	0	0.0	1	.9	0	0.0
Washing with water and soap can remediate contaminations caused by those materials.												
Yes	405	31.3	173	32.4	232	30.5	305	29.7	39	33.9	61	40.4
No	636	49.1	277	51.9	359	47.2	540	52.5	43	37.4	53	35.1
Don't know	252	19.5	83	15.5	169	22.2	183	17.8	32	27.8	37	24.5
Missing	1	.1	1	.2	0	0.0	0	0.0	1	.9	0	0.0

Table 10 continued; P*lease rate the following statements for biological materials. (N= 1294).*

	Total		Gender				Country of current residence					
			Male N=534		Female N=760		Germany N=1028		UK N=115		Others N=151	
The distance to those materials has an impact on the extent of harm to one's body.												
Yes	692	53.5	272	50.9	420	55.3	527	51.3	63	54.8	102	67.5
No	426	32.9	206	38.6	220	28.9	365	35.5	30	26.1	31	20.5
Don't know	175	13.5	55	10.3	120	15.8	136	13.2	21	18.3	18	11.9
Missing	1	.1	1	.2	0	0.0	0	0.0	1	.9	0	0.0
The length of time of exposure to these issues has an impact on the harm done to one's body.												
Yes	495	38.3	211	39.5	284	37.4	345	33.6	64	55.7	86	57.0
No	633	48.9	277	51.9	356	46.8	555	54.0	36	31.3	42	27.8
Don't know	165	12.8	45	8.4	120	15.8	128	12.5	14	12.2	23	15.2
Missing	1	.1	1	.2	0	0.0	0	0.0	1	.9	0	0.0
A person exposed to these issues will inevitably have serious long term health problems.												
Yes	506	39.1	219	41.0	287	37.8	391	38.0	47	40.9	68	45.0
No	454	35.1	206	38.6	248	32.6	377	36.7	33	28.7	44	29.1
Don't know	334	25.8	109	20.4	225	29.6	260	25.3	35	30.4	39	25.8
Missing	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Note. Values are total scores and percentages for each option.

Table 11 Please rate the following statements for chemical materials. (N= 1294).

	Total		Gender				Country of current residence					
			Male N=534		Female N=760		Germany N=1028		UK N=115		Others N=151	
Can be absorbed through the skin.												
Yes	1192	92.1	495	92.7	697	91.7	959	93.3	102	88.7	131	86.8
No	37	2.9	17	3.2	20	2.6	26	2.5	6	5.2	5	3.3
Don't know	64	4.9	21	3.9	43	5.7	43	4.2	6	5.2	15	9.9
Missing	1	.1	1	.2	0	0.0	0	0.0	1	.9	0	0.0
Can be absorbed through the air and food.												
Yes	1237	95.6	519	97.2	718	94.5	998	97.1	103	89.6	136	90.1
No	18	1.4	6	1.1	12	1.6	11	1.1	4	3.5	3	2.0
Don't know	38	2.9	8	1.5	30	3.9	19	1.8	7	6.1	12	7.9
Missing	1	.1	1	.2	0	0.0	0	0.0	1	.9	0	0.0
It is advisable to seek shelter in basements.												
Yes	460	35.5	194	36.3	266	35.0	359	34.9	37	32.2	64	42.4
No	431	33.3	207	38.8	224	29.5	355	34.5	34	29.6	42	27.8
Don't know	402	31.1	132	24.7	270	35.5	314	30.5	43	37.4	45	29.8
Missing	1	.1	1	.2	0	0.0	0	0.0	1	.9	0	0.0
It is advisable to wear a protective mask.												
Yes	1111	85.9	460	86.1	651	85.7	873	84.9	104	90.4	134	88.7
No	84	6.5	44	8.2	40	5.3	77	7.5	2	1.7	5	3.3
Don't know	98	7.6	29	5.4	69	9.1	78	7.6	8	7.0	12	7.9
Missing	1	.1	1	.2	0	0.0	0	0.0	1	.9	0	0.0

Table 11 continued; *Please rate the following statements for chemical materials. (N= 1294).*

	Total		Gender				Country of current residence					
			Male N=534		Female N=760		Germany N=1028		UK N=115		Others N=151	
A person-to-person spread is possible.												
Yes	270	20.9	127	23.8	143	18.8	199	19.4	35	30.4	36	23.8
No	788	60.9	343	64.2	445	58.6	663	64.5	50	43.5	75	49.7
Don't know	235	18.2	63	11.8	172	22.6	166	16.1	29	25.2	40	26.5
Missing	1	.1	1	.2	0	0.0	0	0.0	1	.9	0	0.0
Washing with water and soap can remediate contaminations caused by those materials.												
Yes	605	46.8	269	50.4	336	44.2	474	46.1	61	53.0	70	46.4
No	410	31.7	170	31.8	240	31.6	349	33.9	23	20.0	38	25.2
Don't know	278	21.5	94	17.6	184	24.2	205	19.9	30	26.1	43	28.5
Missing	1	.1	1	.2	0	0.0	0	0.0	1	.9	0	0.0
The distance to those materials has an impact on the extent of harm to one's body.												
Yes	1008	77.9	419	78.5	589	77.5	803	78.1	86	74.8	119	78.8
No	142	11.0	70	13.1	72	9.5	117	11.4	14	12.2	11	7.3
Don't know	143	11.1	44	8.2	99	13.0	108	10.5	14	12.2	21	13.9
Missing	1	.1	1	.2	0	0.0	0	0.0	1	.9	0	0.0
The length of time of exposure to these issues has an impact on the harm done to one's body.												
Yes	1067	82.5	446	83.5	621	81.7	834	81.1	101	87.8	132	87.4
No	104	8.0	52	9.7	52	6.8	91	8.9	8	7.0	5	3.3
Don't know	123	9.5	36	6.7	87	11.4	103	10.0	6	5.2	14	9.3
Missing	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
A person exposed to these issues will inevitably have serious long term health problems.												
Yes	592	45.7	245	45.9	347	45.7	466	45.3	50	43.5	76	50.3
No	394	30.4	186	34.8	208	27.4	315	30.6	38	33.0	41	27.2
Don't know	308	23.8	103	19.3	205	27.0	247	24.0	27	23.5	34	22.5
Missing	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Note, Values are total scores and percentages for each option.

2.5 CBRN risk perceptions

Risk perception is an important construct since it has been argued that risk has to be perceived as such in order to initiate preparedness behaviour and to be more open concerning helpful information. If one does not perceive an incident to be likely or to have any kind of impact on one's life, it might be harder to introduce safety measures and regulations. In this context, perceived risk was analysed concerning different dimensions and in a more global way. Figure 4 and Table 12 display how often people worry about their own safety and how often they think about the possibility of a terrorist attack. Especially terrorism seems to be no issue, since almost half of the sample (45%) never thinks about the possibility of a terrorist attack in their country. In general people do more often worry about their own safety than about the possibility of a terrorist attack.

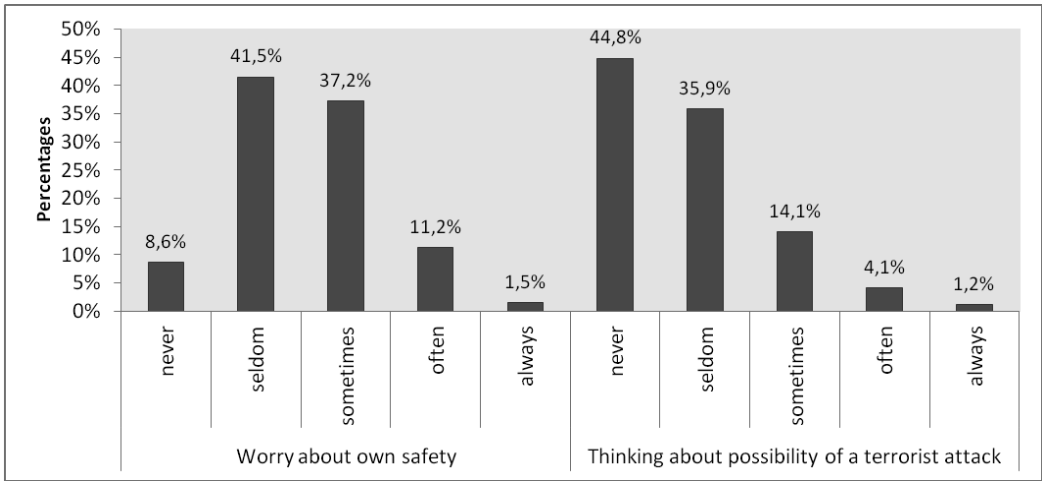


Figure 4 Worry about safety and terrorist attacks (N = 1294).

Table 12 Worry and thoughts (N= 1294).

	Total	Gender		Country of current residence		
		Male	Female	Germany	UK	Others
	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)
Worry about own safety	2.55 (0.86)	2.40 (0.86)	2.66 (0.83)	2.54 (0.83)	2.56 (0.83)	2.64 (1.00)
Thinking about possible terrorist attack	1.81 (0.91)	1.80 (0.96)	1.82 (0.87)	1.75 (0.84)	2.06 (1.05)	2.01 (1.12)

Note. Values are mean scores on a 5- point scale (1= never. 5= always).

The different dimensions of perceived risk in Figure 5 support the view of terrorism as a low-probability, high-impact event. The likelihood of such an event is evaluated to be very low but the general impact of CBRN events is considered to be very high. The dimensions *likelihood* and *concern* are quite similarly rated by the present sample as are the dimensions *general impact* and *personal consequences*.

In order to compare the evaluation of terrorism and especially CBRN terrorism risk, participants did also rate other events concerning these four dimensions (see Table 13). The probability and concern are perceived highest for traffic accidents and fires and lowest for a meteor strike. This order changes with respect to the general impact and personal consequences of such an event. These dimensions are perceived highest for the different types of terrorism and the meteor strike whereas the general impact and personal consequences of a fire, a lighting stroke and a traffic accident are perceived lowest. In general, risk perception differs with respect to CBRNE. Conventional terrorism is considered to be a little more likely than CBRN terrorism, but the impact of CBRN terrorism is perceived higher (especially for nuclear terrorism) than for conventional terrorism.

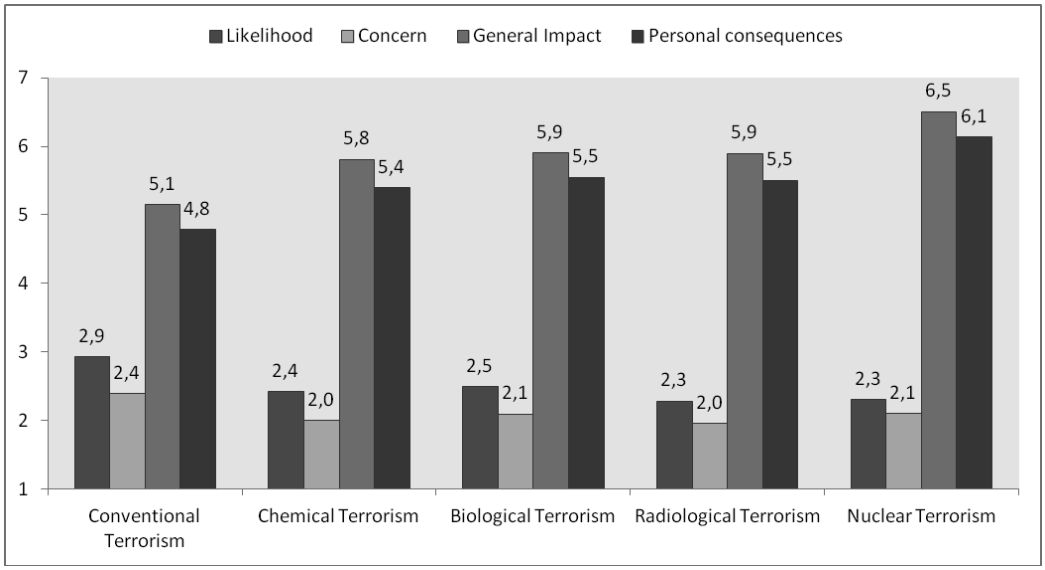


Figure 5 Perceived risk of terrorism (mean values on a scale from 1-7, N = 1294).

Table 13 Perceived risk concerning different events (N = 1294).

	Likelihood	Concern	General Impact	Personal consequences
Incidents	M (SD)	M (SD)	M (SD)	M (SD)
Fire	4.42 (1.42)	3.75 (1.76)	3.39 (1.79)	3.89 (2.06)
Flood	3.59 (1.75)	2.66 (1.68)	4.30 (1.41)	3.83 (1.73)
Earthquake	2.09 (1.30)	1.84 (1.37)	4.27 (1.60)	3.90 (1.80)
Conventional terrorism (E)	2.93 (1.57)	2.39 (1.64)	5.15 (1.51)	4.78 (1.78)
Chemical terrorism	2.42 (1.43)	2.00 (1.44)	5.81 (1.35)	5.39 (1.64)
Biological terrorism	2.50 (1.47)	2.09 (1.54)	5.91 (1.32)	5.55 (1.61)
Radiological terrorism	2.28 (1.36)	1.95 (1.40)	5.90 (1.36)	5.50 (1.65)
Nuclear terrorism	2.30 (1.46)	2.10 (1.59)	6.51 (1.06)	6.13 (1.41)
Traffic accident	5.34 (1.33)	4.68 (1.73)	3.33 (1.84)	3.83 (2.07)

Table 13 continued; Perceived risk concerning different events (N = 1294)

	Likelihood	Concern	General Impact	Personal consequences
Incidents	M (SD)	M (SD)	M (SD)	M (SD)
Solar storm	2.56 (1.58)	1.78 (1.30)	4.07 (1.85)	3.91 (1.95)
Lightning stroke	3.78 (1.69)	2.74 (1.70)	2.83 (1.58)	3.11 (1.85)

Note. Values are mean scores on a 7- point scale (1= *not at all*, 7= *extremely*).

Preparedness

Looking at the actual preparedness of the sample (see Table 14), it is rather unprepared. Only 10% have at least partially put together an emergency supply kit (including extra batteries, a flashlight, food and water, radio) whereas about half of the sample (49.8%) has not even thought about doing so in the future. Preparedness at one's home seems to be better since almost half of the sample (44.5%) has a smoke detector in their home, but it needs to be noted that a smoke detector is mandated in many federal states in Germany and therefore people living in a rented apartment usually have no influence in the decision. Some participants did also note the fact that they would never have thought about a smoke detector but it was installed by the apartment/building manager. Having a first aid box at home seems to be one preparedness activity that is quite common.

Table 14 *Actual preparation (N=1294)*.

To what extent have you thought about or done the following:	M (SD)	N	%
Putting together an emergency supply kit (including extra batteries. a flashlight. Food and water. radio)	1.83 (1.05)		
Total		1294	100
Neither thought about nor done		644	49.8
Thought a little. but not done		386	29.8
Thought a lot. but not done		121	9.4
Have done a little. or partially completed		120	9.3
Have done a lot. or completed		23	1.8
Establishing a meeting area or method of contact with family	1.63 (1.01)		
Total		1294	100
Neither thought about nor done		822	63.5
Thought a little. but not done		274	21.2
Thought a lot. but not done		92	7.1
Have done a little. or partially completed		73	5.6
Have done a lot. or completed		33	2.6
Learning about evacuation plans in buildings you frequently occupy	1.86 (1.25)		
Total		1294	100
Neither thought about nor done		765	59.1
Thought a little. but not done		234	18.1
Thought a lot. but not done		66	5.1
Have done a little. or partially completed		170	13.1
Have done a lot. or completed		59	4.6

Table 14 continued; *Actual preparation (N=1294).*

To what extent have you thought about or done the following:	M (SD)	N	%
Avoiding public places and crowds	1.69 (1.09)		
Total		1294	100
Neither thought about nor done		826	63.8
Thought a little. but not done		231	17.9
Thought a lot. but not done		87	6.7
Have done a little. or partially completed		117	9.0
Have done a lot. or completed		33	2.6
Equipping your home with a first aid box	2.94 (1.62)		
Total		1294	100
Neither thought about nor done		404	31.2
Thought a little. but not done		194	15.0
Thought a lot. but not done		96	7.4
Have done a little. or partially completed		274	21.2
Have done a lot. or completed		326	25.2
Equipping your house/flat with smoke detectors	3.52 (1.62)		
Total		1294	100
Neither thought about nor done		267	20.6
Thought a little. but not done		154	11.9
Thought a lot. but not done		94	7.3
Have done a little. or partially completed		203	15.7
Have done a lot. or completed		576	44.5
Other	.70 (1.12)		
Total		1294	100
Not applicable		1215	93.9
Applicable		79	6.1
Neither thought about nor done		3	3.8*
Thought a little. but not done		6	7.6*
Thought a lot. but not done		7	8.9*
Have done a little. or partially completed		26	32.9*
Have done a lot. or completed		37	46.8*

Note. Values are mean scores on a 5- point scale (1= Neither thought about nor done. 5= Have done a lot. Or completed); * percentages with respect to applicable answers only