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KnowRISK

Know your city, Reduce seismic risk through non-structural elements

Prevention and preparedness projects in civil protection and marine pollution. Prevention Priorities

Deliverable Report

Deliverable D3 – On-going Social Impact Assessment report

Task D – Going into target-communities

Deliverable E5 – Social Impact Assessment Report: how far was risk communication in terms attitudinal change towards earthquake hazard and non-structural protection?

Task E – Tools and strategies of risk communication and learning

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1.DESCRPTION OF THE DELIVERABLE

1.1 Introduction

Assessment of efficacy, rarely taken into account within risk communication actions (Infanti et al., 2013), is a fundamental novelty of the KnowRISK communication strategy and is aimed at providing replicable tools for other European countries.

Risk communication efficacy was planned to stand on a survey design where a questionnaire would be applied before the start of the intervention (T0), and an ex-post survey at the end of the process (T1). This design was meant to evaluate the initial condition of the students at T0, in order to derive the impact of the project action and to acquire important information for future interventions. However, because quantitative assessments might not be fully exhaustive, we also used different tools to provide a more in-depth qualitative evaluation. Each team chose his own way: the Portuguese team used a notebook for content analysis; the Italian team used the focus group strategy. The procedure is described within this document.

This document stands on three papers submitted at the ICESD conference held in Reykjavik, June 12-14 2017, that hosted a KnowRISK project special session:

- Seismic risk communication: how to assess it? The case of Lisbon pilot-area- by D. Sousa e Silva, A. Pereira, M.Vicente, R. Bernardo, M.A. Ferreira, M. Lopes, C. S. Oliveira;
- Risk Perception and Knowledge: the construction of the Italian questionnaire to assess the effectiveness of the KnowRISK Project actions- by M. Crescimbene, N. A. Pino, G. Musacchio ;
- Development of a common (European) tool to assess earthquake risk communication - by S. Platt, G. Musacchio, M. Crescimbene, N. A. Pino, D. S. Silva, M. A. Ferreira, C. S Oliveira, M. Lopes, R. Rupakhety .

The following is a new -not planned- deliverable incorporate D3 "On-going Social Impact Assessment report" and E5 " Social Impact Assessment Report: how far was risk communication in terms of behaviour change? ". It was prepared with the aim of having the whole assessment procedure of the communication campaign in schools in one single document. The design, implementation and discussion of the assessment will be presented following a case-study approach in the three countries of the KnowRISK consortium.

1.2 Pilot areas peculiarities and Approach to Assessment

1.2.1. Portuguese Case

Seismic hazard in Portugal derives, mainly, from two contributions: offshore sources (interplate) that can cause large events, such as the 1755 Great Lisbon Earthquake and intraplate onshore faults, such as the Lower Tagus Valley Fault that cause moderate earthquakes near the Metropolitan Area of Lisbon. Unlike Italy or Iceland pilot-areas, this is an area where earthquake occurrence is marked by long-time spans. This geological particularity explains, in part, the low degree of intrusiveness of earthquake-related information in people's daily lives. The pilot-area in Portugal, chosen for the implementation of KnowRISK intervention and assessment, is Lisbon.

Risk communication in Lisbon pilot-area involved two secondary schools — Rainha D. Leonor and Padre António Vieira — and covers approximately 120 students of the 7th and 8th grades with ages between the 12 and the 16 years old. The intervention was structured into a set of activities, which became part of a chair of the 7th and 8th grades curricula, called as education for citizenship. KnowRISK intervention programme was the same in the two schools and comprehended a set of sessions/activities. Students and scientists interacted in a regular basis for a period of two to four months. In Rainha D. Leonor School, sessions and activities were not sequential resulting in a longer intervention than in Padre António Vieira School, where activities happened once a week and in a sequential way.

Assessing the impacts of a risk communication process, such as the one pursued under KnowRISK project, implies answering two basic questions: i) “what is it meant to assess?”, and ii) “how to assess it?”. The first question sends us to the risk communication aims. The second-mentioned question concerns the research strategy and the most appropriate methodological options taken in order to proceed with the assessment.

Becker et al (2012) emphasise that the efficacy of education for seismic safety is often inhibited by an incomplete understanding of the process by which individuals decide to protect themselves from harm (Becker et al. 2012). These authors posit that individuals pass through a series of cognitive and social stages until they decide to protect themselves. Those stages are, respectively: knowledge and awareness of earthquake hazard and protective measures; thinking and talking about the subject with others; understanding the consequences of earthquake phenomena in individuals near environment; and developing skills. Based on this assumption, KnowRISK risk communication was planned in order to achieve the following aims:

- To foster knowledge and awareness about risk and protective measures;
- To stimulate the formation of favorable beliefs and behavioral intentions towards the adoption of protective behaviors.

For several reasons discussed elsewhere (cf. Sousa e Silva et al., 2017), it was found unrealistic to set as an aim the adoption of protective behaviours in the short-term. As mentioned by Weinstein (1988), the adoption of new protective behaviours is usually a relatively long process, made of advances and retreats. Further, it should be taken into account that, in Lisbon, earthquake hazard has a low level of intrusiveness in people's daily lives. Finally, teenagers are our target-group, a social group without full autonomy to make changes in their own homes.

Answering to the question of "how to assess?" KnowRISK intervention implied a set of choices concerned with the theory, the research design and underlying methods. This paper aims at presenting the theory underlying the assessment of KnowRISK intervention in Lisbon pilot-area and to discuss some of the methodological challenges that this type of evaluation research (Bryman, 2011) poses.

1.2.2. Italian Case

In general terms, Italy is a country with recurrent earthquakes but a low level of prevention. The pilot areas for the KnowRISK intervention were selected based on two criteria: i) areas affected by the most common non-structural vulnerability; ii) areas where it was possible to have a high range of target public and good support from the school boards. In the Mt Etna pilot area the KnowRISK intervention involved schools in the city of Catania, a high seismic hazard zone. Recent earthquakes, associated with moderate shaking, had caused non-structural damage. The Northern Italy pilot area was chosen to involve schools located in regions with moderate to medium level of hazard; these being seismic zones where strong earthquakes are rare but non-structural damage, for example during the 2012 Emilia earthquake, can be widespread and cause anxiety for people living all over Northern Italy. Here the moderate to medium level of hazard is often associated to a high population density and industrial and infrastructure concentration.

The ItaQ theoretical framework is structured on a distinction between Perception, Knowledge and Action (PKA): perception is what people think about earthquake risk, knowledge is related to awareness and what they know and understand about earthquakes and action is related to behavior and their propensity to take preventative action. Even if they know and are aware of the risk, people may not necessarily change their behaviour or adopt preventative measures. Previous research on perception in Italy suggests the reason for inaction laid in people's feelings, attitudes and beliefs (Crescimbeni et al., 2015a). The ItaQ questionnaire was built on this going research and on seismic risk perception questionnaire that had already collected over 8,500 answers from a wide range of people that had found that only 6% and 17% of people respectively living in higher

and lower hazard areas have adequate perception of risk (Crescimbene et al., 2014; Crescimbene et al., 2015a). The ItaQ had a specific add-on concerning non-structural components of building (Crescimbene et al., 2015b).

The Italian team could profit from an established experience concerning assessment data collection throughout the entire country. In recent years a web-based questionnaire and a telephone survey CATI (Computer Assisted Telephone Interview) were used to study seismic risk perception in Italy. Statistical analysis over a sample of 8,500 respondents showed good reliability of the indicators of hazard, exposure and vulnerability (Crescimbene et al., 2016). The design and construction of these questionnaires was mainly inspired by the theories and methodologies developed in risk perception research (Flischoff et al, 1978; Slovic, 1987; 1992; 2000; 2002; Wachinger, 2010).

The results relating to the hazard perception in the CATI survey suggest that only 6% and 17% of people respectively living in higher and lower hazard areas have adequate perception. Overall, 61% of the entire population admit to being only “slightly” or “not at all informed” about earthquakes and less than 5% have ever participated in risk reduction initiatives.

Because the ItaQ was meant to measure people's perception it made extensive use of the semantic differential, listing a large number of attribute and mixing relevant and non-relevant in order to capture people's perception. The method uses bipolar Likert scales (typically 5 or 7 point scales) using contrasting adjectives, for example strong and weak (Likert, 1932; Osgood et al., 1957; Slovic and Weber, 2002).

During the research it became clear that students and schools had difficulties in responding to the questionnaire on-line at school. The questionnaire was long and challenged students attention; schools had to make available a much too large amount of their time devoted to classes (Crescimbene et al., 2017). For this reason, during the project it was considered useful to converge in a shorter and easier to administer common questionnaire (see paragraph 1.3).

1.2.3 Icelandic Case

The pilot-area in Iceland is within the South Iceland Seismic Zone (SISZ), the largest agricultural region in Iceland where destructive earthquakes up to magnitude 7 can be expected. Several small towns and villages, schools, medical centers, industrial plants, geothermal and hydropower plants, and several major bridges are located in this area. In fact, it contains the entire infrastructure that characterizes a modern society. Since 2000 three strong earthquakes (Mw 6.5, 6.5 and 6.3) have affected the area keeping a high level of awareness in the local communities (Bernharðsdóttir et al, 2016). Residential buildings in SISZ underwent significant ground shaking in these events but without severe structural damage (Bessason et al. 2016) and no fatalities or severe injuries. Most of the monetary losses were non-structural and related to cosmetic damage of flooring due to

falling objects as well as cosmetic damage of non-structural walls that needed paint work (Bessason et al. 2014, 2016). During the earthquakes in June 2000, inhabitants reported difficulty or even impossibility to move to a safe place inside their dwellings (Sigbjörnsson et al., 2018). In this framework, communication should put great emphasis on the fact that even though structural elements are robust, non-structural damage still can cause high costs in terms of injuries, economy, and social resilience.

Assuming that the school children are familiar with effects of earthquakes and safety measures, the approach used in Iceland was to conduct a quick intervention action, highlighting the most important issues.

1.3 The Assessment in the Schools. Towards a Common Questionnaire (Portugal-Italy-Iceland)

The first step taken in order to arrive to a common questionnaire was the assessment of the Portuguese Questionnaire and the Italian Questionnaire, together with their theory underpinning. A detailed comparison can be found in Platt et al. (2017).

The questionnaires had similar but subtly different theoretical frameworks – the ItaQ put greater emphasis on trying to measure what people unconsciously do and distinguish between rational, emotional and intuitive understanding and behaviour (Crescimbeni et al., 2017).

An assessment of the two questionnaires and their performance was made working with the native language versions together with data from the T0 surveys. The task was to judge how well the questions met the aim of assessing children's risk awareness and to what extent the two surveys were comparable. The main difference was in their length. The ItaQ questionnaire was nearly three times longer than the LisQ version (164 questions compared to 65). Colour coding analysis identified 22 equivalent questions, 12 of which allowed comparison between the two surveys. Based on an analysis of this pilot study data, an assessment was made about which questions were produced consistent and reliable answers and should therefore be retained. Even though few questions could be directly compared, there was a clear pattern.

In the first section the students were asked about the earthquake resistance of their home and school and what they thought would happen in a mild earthquake. They were then asked about their attitudes to and knowledge of earthquakes, and finally how important they thought various preventative actions might be.

The final version of common questionnaire was pre-tested in the three participating countries in order to assess the extent to which the questions were understandable, feasible and pertinent taking into account the cultural and disaster-related specificities of each participating country.

Although not used in Portuguese pilot-area for KnowRISK intervention assessment, the common questionnaire was pre-tested in Portugal with 51 students (15–16 year-old) and four teachers in February 2017 (for more details, refer to the Deliverable D3 version April 2017).

1.4. The Survey in Portuguese case-study

1.4.1. Experimental design and administration

The assessment of KnowRISK intervention implied the adoption of an evaluation research design. Methodologically, this corresponded to a type of research based in two groups: one group that was targeted to KnowRisk intervention, so-called as Experimental Group, and another group that was not subject to the intervention, so-called as Control Group. The methodological option of having a Control Group was based on the assumption that it could be advantageous for the assessment of eventual changes, induced by the intervention, to have two groups: one that was not exposed to KnowRisk information and another one that was exposed to it.

The theoretical framework adopted in KnowRISK assessment stands on Weinstein's model, so-called as Precaution Adoption Process Model (PAPM), with insights coming from other theoretical approaches. Weinstein conceptualizes the precaution adoption process into a series of stages corresponding to beliefs people hold their *susceptibility towards harm* and *perceived efficacy of precaution*. As described in Figure 7, beliefs about *susceptibility towards harm* range from "ignorance of the threat" to "belief in personal susceptibility", or perceived vulnerability towards a threat. The criteria that define the stages are, respectively: risk awareness, belief in general susceptibility and belief in personal susceptibility. Changes in individuals' thoughts and behaviour are expected when they surpass a certain threshold and personalize the threat. Generally, risk awareness prevails over the awareness of protection alternatives. It is only after people realize the risks they face that they feel compelled to find out how can they protect themselves. Beliefs about the efficacy of precaution range from the "ignorance about available precautions" to the belief on individual's own capacity to take precaution.

Evaluation research design was structured to stand in a quantitative approach where a questionnaire was applied to the same sample of students before the beginning of the Knowrisk intervention (Timing 0-T0) and after it (Timing 1-T1). Students belonged to three schools of Alvalade parish, respectively:

- Rainha D. Leonor School and Padre António Vieira School (109 students), where KnowRisk intervention occurred (these students correspond to Experimental Group);
- Eugénio dos Santos School (59 students), where no intervention occurred and the inquiry had as main aim to assure the existence of a Control Group.

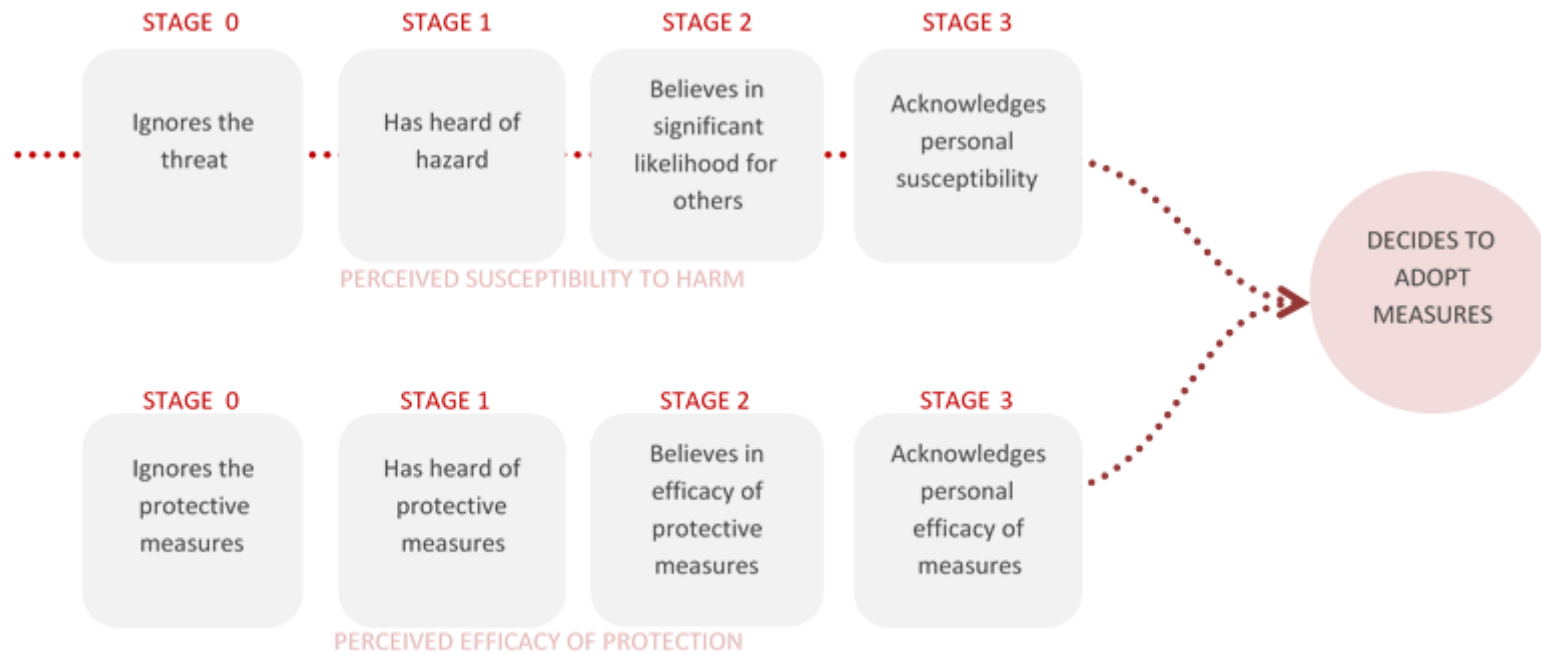
As mentioned, these three schools are part of Alvalade parish. This means that students often circulate from one school to another along their school cycle. T0 and T1 questionnaires were applied in the three schools. It was a self-completion questionnaire administrated in the classroom with the supervision of the Knowrisk research team.

In the specific case of Eugénio dos Santos School, it should be referred that questionnaire was applied in the two moments of inquiry (T0 and T1) and almost at the same time as the other schools.

Data analysis stood in a comparative approach where two general type of comparisons were made: comparison between T0 survey (applied before the intervention) and T1 survey (applied approximately two months after the KnowRisk intervention); comparison between Experimental Group (participated on the intervention) and Control Group (not exposed to intervention). Students age ranged from 12 to 14 years old and were, at the time, at the 7th and 8th grades.

Next, the results of the assessment of KnowRisk intervention in the Portuguese case study will be systematized. First, a detailed description of both *perceived susceptibility towards seismic risk* and *perceived efficacy of protection* will be made, based on the battery of indicators used to operationalize each concept. Through such description it will be possible to understand the beliefs towards risk and protection of our sample before the intervention (T0 survey) and afterwards (T1 survey). This section will end with a statistical distribution of our sample through the four stages underlying the above-mentioned concepts of the model (cf. Figure 1).

Figure 1. Precaution Adoption Process Model (Weinstein, 1988)



1.4.2. T0 data

Perceived susceptibility towards seismic risk

Earthquakes were perceived as probable events by almost a half of students in T0 survey. Nevertheless, earthquake issue did not seem to be a salient issue on individuals' lives.

As indicated in Figure 2, perceived probability of an earthquake occurrence was surprisingly high among students belonging to Experimental Group. Approximately 56% classified earthquakes as something probable or highly probable to occur in Lisbon, against 35,6% of subjects from Control Group. However, such awareness towards Lisbon proneness to seismic hazard did not seem to translate into thought about it. Salient matters are those that are frequently in our minds, commanding out attention and thought about it.

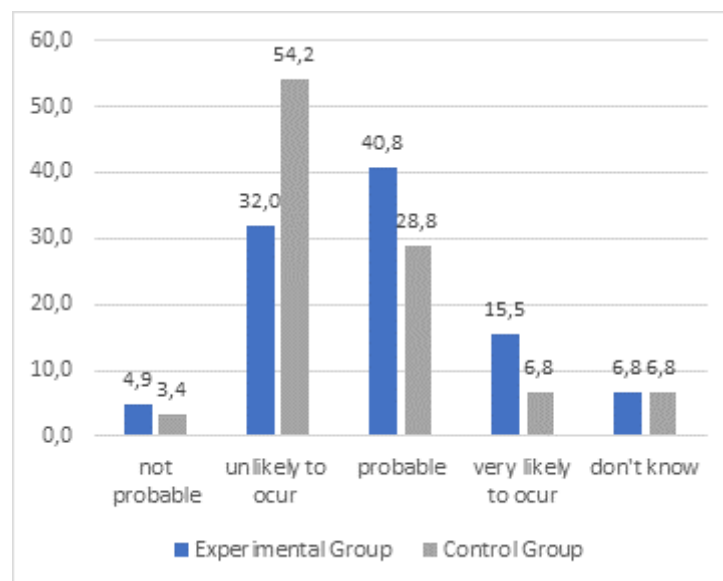


Figure 2. Perceived probability of earthquake occurrence in T0 survey

Salience towards earthquake threat was measured with a set of three questions where subjects expressed how much they thought, feared and worry with earthquakes in their own city. As mentioned, earthquake risk was something about which more than a half of students seldom thought about it. Nevertheless, more than 50% of respondents of both Experimental Group and Control Group stated to worry about or, even, feel fear (cf.

Table 1). Indeed, we can be concerned or fear over some eventuality, yet seldom think about it because of a tendency to become absorbed on more immediate concerns.

Table 1. Thought, concern and fear in T0 survey

	Experimental Group		Control Group	
	Nul-low	Medium-high	Nul-low	Medium-high
Think	63,7	36,3	54,2	45,8
Worry	45,5	55,0	40,7	59,6
Fear	57,1	42,9	39,0	61,1

On the basis of the above-mentioned variables (perceived probability of earthquake event and think-worry-fear set), a new variable was built with the aim of measuring salience of earthquake concern. As can be seen through Figure 3, earthquake threat was something with low level of salience among students belonging both to Experimental Group and Control Group.

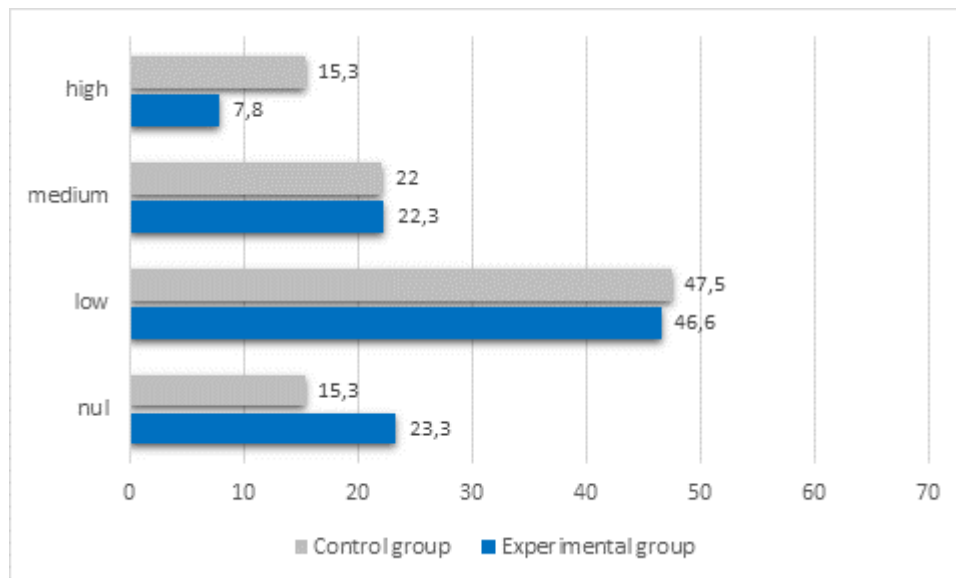


Figure 3. Salience of earthquake concern in T0 survey

Analysis of *perceived susceptibility towards harm* also included a set of questions directed to answer the following questioning: To what extent does our target-group feel vulnerable to earthquake hazard? The belief in our own vulnerability is a way of personalizing threat, which is fundamental to prompt to any kind of action.

The above-mentioned questioning was operationalized through a set of three questions where subjects were asked to evaluate the degree of proneness of Lisbon city, their own neighborhood and their house towards earthquake hazard. On the basis of this set questions a new variable was built so-called as perceived vulnerability towards earthquake hazard.

More than a half of students revealed to be relatively optimistic regarding to their own vulnerability towards an earthquake. Such optimism doesn't seem to have suffered a big change after the intervention.

According with T0 survey results, 33% of respondents revealed to believe that, if an earthquake happens in Lisbon, such event would cause low damage to the city, their neighborhood and house. Approximately 30% revealed to optimism concerning their own house, stating that it would not suffer much damage, by comparison with the neighborhood and the city. The same trend was found in both Experimental Group and Control Group (cf. Figure 4).

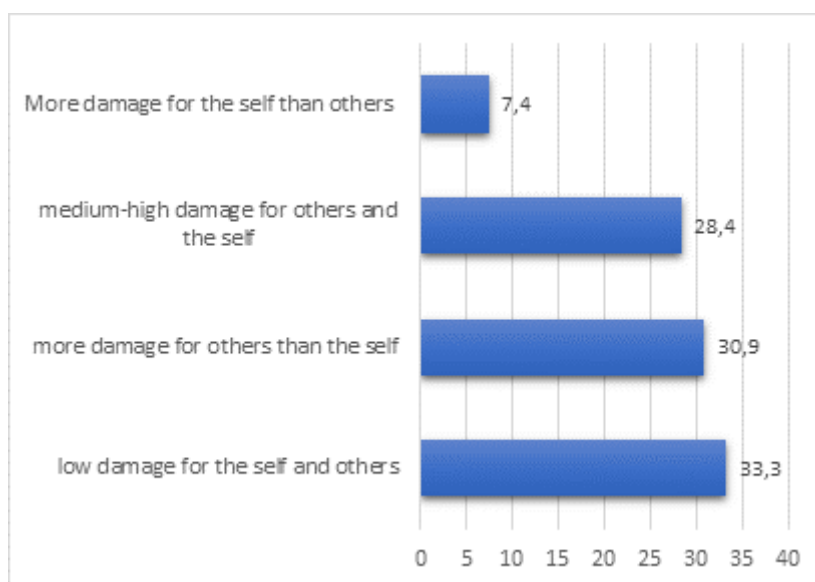


Figure 4. General perceived vulnerability towards earthquakes in T0 survey

Nevertheless, in T0 survey there was a non-negligible volume of subjects (28%) of students who saw themselves, their neighborhood or the city as equally highly vulnerable to an earthquake. This was especially evident among students belonging to Experimental Group, in detriment of Control Group.

Perceived efficacy of protection

In T0 survey, a significant volume of students revealed a positive attitude towards protection against seismic risk and those who went on details referred fundamentally disaster-response related behaviors.

The above-mentioned positive attitude was particular evident among students belonging to Experimental Group. As Table 2 shows, more than a half of them stated that something can be done towards seismic protection against 44% of students belonging to Control Group. A similar pattern can be found in what concerns to the need of taking precautions in the particular case of Lisbon. At least, a half of students answered 'yes' to the need of taking precautions. However, it is striking the volume of individuals, especially from Control Group, who state not knowing if it necessary to take precautions or not.

Table 2. General attitude towards seismic protection

	Experimental group		Control group	
	n	%	n	%
Possible to do something to protect	75	72,8	26	44,1
Not possible to do something	9	8,7	13	22,0
Don't know	19	18,4	20	33,9
Total	103		59	
Should take precautions - Lisbon	70	68,0	29	49,2
Shouldn't take precaution - Lisbon	8	7,8	4	6,8
Don't know	25	24,3	26	44,1
Total	103	100	59	100

The students who went on details about seismic protection (49,7%) tended to refer disaster related response behaviors, namely: “crawling under a table”, “remain under doorways” or “stay away from heavy objects/windows/wall paintings”. Such behavioral dispositions eventually correspond to the type of earthquake-related information to which these teenagers have been more exposed along their lives (cf. Table 3).

Table 3. References to detailed protective behaviors in T0 survey

		Experiment. Group		Control Group	
		n	%	n	%
Disaster response related behaviours	Crawl under a table	24		10	
	Remain under doorways	15		6	
	Stay away from buildings, go to open field	6		0	
	Stay away from glass objects, windows, wall paintings	12		4	
	Disconnect domestic appliances (gas, electricity)	3		1	
	Do not use the lifts to evacuate	1		0	
	Total	61	41,5	21	75,0
Preparedness related behaviours	First-aid kit	13		1	
	Battery-power radio	6		0	
	flashlight	4		0	
	Storing water and food	7		0	
	Define meeting point with family members	2		0	
	Total	32	21,8	1	3,6
Risk mitigation behaviors	Investing on earthquake resilient buildings	21		6	
	Fastening shelves and tall furniture to the walls	14		0	
	Relocating tall or heavy objects to the bottom shelves	4		0	
	Maintaining all exits from rooms/dwelling clear	5		0	
	Moving away beds, sofas and desks from windows	3		0	
	Using longer curtains as a way to prevent broken glass spreading	1		0	
	Placing anti-slip mats in cabinets to prevent objects to fall down	0		0	
	Hanging pictures to the wall in a safer way	0		0	
	Fastening the TV in order to avoid falling down	0		0	
	Total	48	32,7	6	21,4
Other		6		3	
TOTAL		147		28	

It should be mentioned that the possibility of detailing protective behaviors in the questionnaire was given through an open question where subjects could freely write the protective behaviors that, in their own view, could be adopted.

With exception of the reference to seismic construction, risk mitigation was not particularly salient. Such tendency does not hold in T1 survey. Non-structural risk mitigation protective measures such as “fastening shelves” or “moving heavy objects to

bottom shelves” gains salience, by comparison with the number of references to disaster response related behaviors.

Earthquake problem seemed to be an issue with low relevance on teenagers’ family daily lives. More than a half of teenagers stated not having searched for information in recent times (last 12 months). Earthquake issue was not subject of conversation for the majority of subjects. It is residual the volume of individuals who stated to have taken some kind of protective action, together with family members or alone. Experimental Group and Control Group revealed a similar pattern (cf. Figure 5).

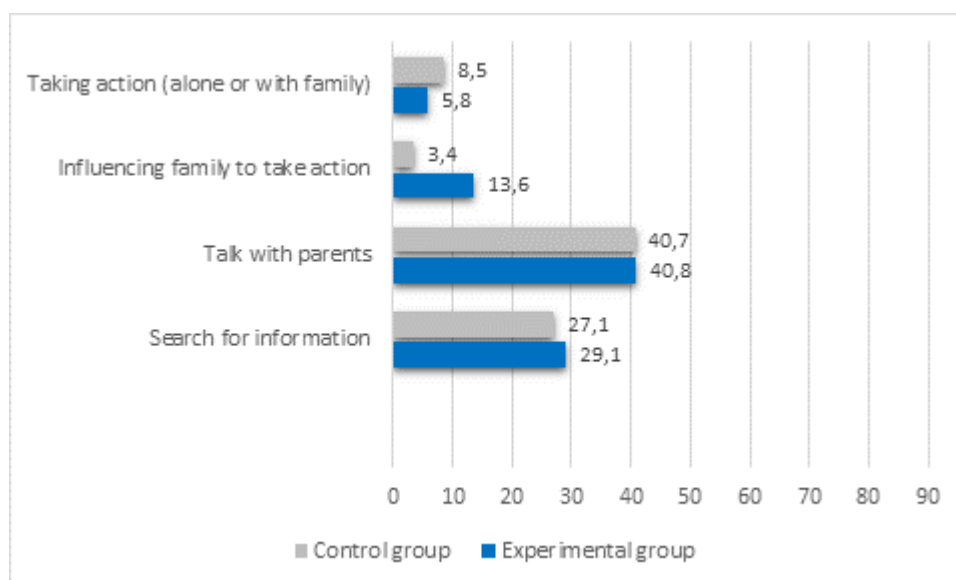


Figure 5. Actions taken by students along the year before T0 survey

1.4.3. T1 data

Perceived susceptibility towards seismic risk

Comparative data analysis of T0 and T1 showed a slightly increase on perceived probability of earthquake occurrence among those belonging to Experimental Group, with more students assessing it as something ‘highly likely to occur’ (cf. Figure 6).

Slight changes were, also, observed on trends related with thought and concern. As indicated in Table 4, there was a small increase of “thinking” and “worrying” with earthquake hazard on individuals belonging to Experimental Group. Although it is

plausible to consider that KnowRisk intervention may have had some influence on such small changes, the fact that Control Group follows a similar pattern doesn't allow us to take safe conclusions on such issue.

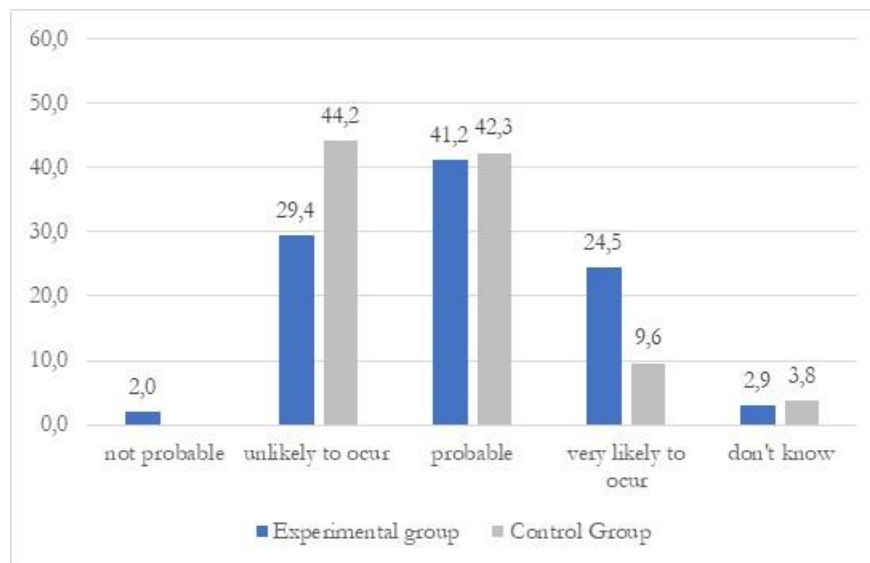


Figure 6. Perceived probability of earthquake occurrence in T1 survey

Table 4. Thought, concern and fear in T1 survey

	Experimental Group		Control Group	
	Nul-low	Medium-high	Nul-low	Medium-high
Think	55,0	45,1	57,7	42,3
Worry	42,0	58,0	44,0	56,0
Fear	57,1	42,9	54,0	46,0

Trends concerning with the salience of earthquake concern confirm what has been said. The levels of low salience of earthquake hazard slightly reduced in Experimental Group, accompanied by a small increase of individuals revealing medium salience levels. Nevertheless, it is among individuals belonging to Control Group where 'high salience' suffers a more intensive increase (cf. Figure 7).

As mentioned, the optimistic attitude towards own vulnerability expressed in T0 survey didn't suffer relevant changes in T1 survey. As indicated in Table 5, the percentage of individuals stating that an earthquake would not cause big harm to themselves did not suffer alterations in T1 survey, both in Experimental Group and Control Group.

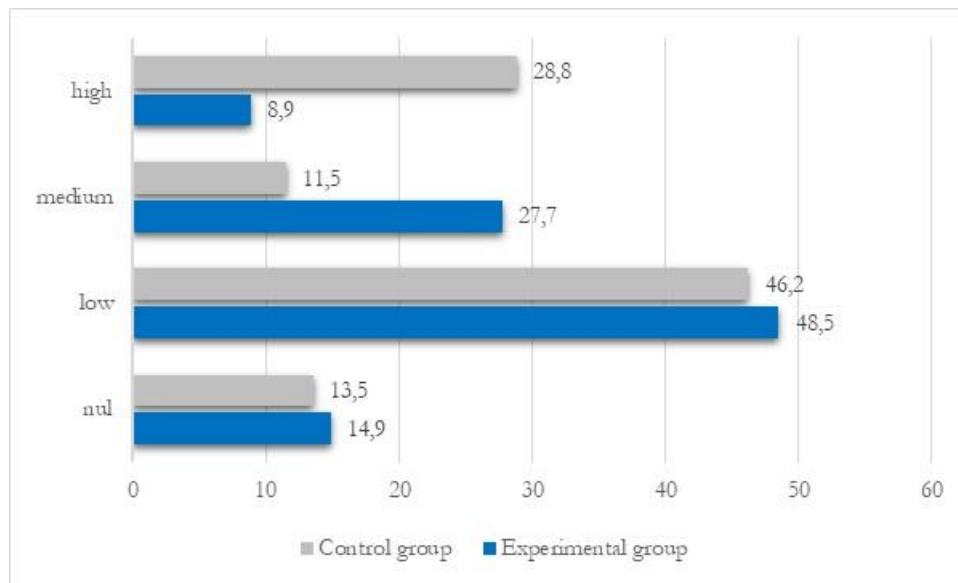


Figure 7. Salience of earthquake concern in T1 survey

Table 5. Perceived vulnerability of earthquakes in T0 and T1 survey

	T0				T1			
	Experimental group		Control group		Experimental group		Control group	
	n	%	n	%	n	%	n	%
low damage for the self and others	33	32,0	21	35,6	34	33,0	23	44,2
more damage for others than the self	29	28,2	21	35,6	30	29,1	8	15,5
medium-high damage for others and the self	35	34,0	11	18,6	35	34,0	19	36,5
More damage for the self than others	6	5,8	6	10,2	4	5,9	2	3,8
Total	103	100,0	59	100,0	103		52	100,0

Perceived efficacy of protection

Comparative data analysis between T0 and T1 survey revealed a reinforcement of the above-mentioned positive attitude towards seismic protection and a higher salience of non-structural mitigation behaviors among those who benefited from KnowRisk intervention.

As Table 6 shows, positive beliefs towards seismic protection and the perceived need to take precautions, in the particular case of Lisbon increased, in both groups. Such increase was, however, more expressive among those belonging to Experimental Group. On the other hand, there was also a decrease of individuals manifesting not knowing if precautions are possible or necessary. Such decrease is more evident among students belonging to Experimental Group.

Table 6. General attitude towards seismic protection in T1 survey

	Experimental Group		Control Group	
	n	%	n	%
Possible to do something to protect	90	91,8	38	73,1
Not possible to do something	1	3,1	1	5,8
Don't know	7	7,1	13	25,0
Total	98		52	
Should take precautions - Lisbon	79	80,6	29	55,8
Shouldn't take precaution - Lisbon	3	3,1	3	5,8
Don't know	16	16,3	20	38,5
Total	98	100	52	100

It should be mentioned that, in the time frame between T0 and T1 surveys, students of Control Group were exposed to earthquake related information because this is a subject which is part of formal *curricula* of geography in the 3rd cycle.

But, the higher distinctiveness between T0 and T1 results becomes evident when we compare the type of mentioned protective behaviors. As referred, the questionnaire included one open question where subjects could freely write the protective behaviors that, in their own view, could be adopted. Content analysis of this question revealed an increase of references to non-structural risk mitigation behaviors in T1 survey, by comparison with T0 survey (cf. Table 7). Such tendency is especially evident in Experimental Group sample, allowing to infer that KnowRisk intervention played a role

on such change. Information about non-structural mitigation seems to have entered on students' consciousness.

Table 7. References to detailed protective behaviors in T1 survey

		Experiment. Group		Control Group	
		n	%	n	%
Disaster response related behaviours	Crawl under a table	7		12	
	Remain under doorways	3		5	
	Stay away from buildings, go to open field	2		3	
	Stay away from glass objects, windows, wall paintings	2		5	
	Disconnect domestic appliances (gas, electricity)	2		0	
	Do not use the lifts to evacuate	3		1	
	Total	19	9,0	26	51,0
Preparedness related behaviours	First-aid kit	22		3	
	Battery-power radio	5		2	
	flashlight	6		2	
	Storing water and food	15		1	
	Define meeting point with family members	14		2	
	Total	62	29,4	10	19,6
Risk mitigation behaviors	Investing on earthquake resilient buildings	14		6	
	Fastening shelves and tall furniture to the walls	42		3	
	Relocating tall or heavy objects to the bottom shelves	24		1	
	Maintaining all exits from rooms/dwelling clear	21		2	
	Moving away beds, sofas and desks from windows	5		0	
	Using longer curtains as a way to prevent broken glass spreading	5		0	
	Placing anti-slip mats in cabinets to prevent objects to fall down	7		0	
	Hanging pictures to the wall in a safer way	2		0	
	Fastening the TV in order to avoid falling down	2		0	
	Total	122	57,8	12	23,5
Other		8		3	
TOTAL		211		51	

Earthquake issue was pointed out as subject of conversation by the majority of students who was exposed to KnowRisk intervention. Further, approximately a half of these

students referred to have tried to influence their parents to take precautions and 18% stated to have taken some kind of action. As Figure 8 illustrates, this pattern is quite distinct from the one corresponding to Control Group.

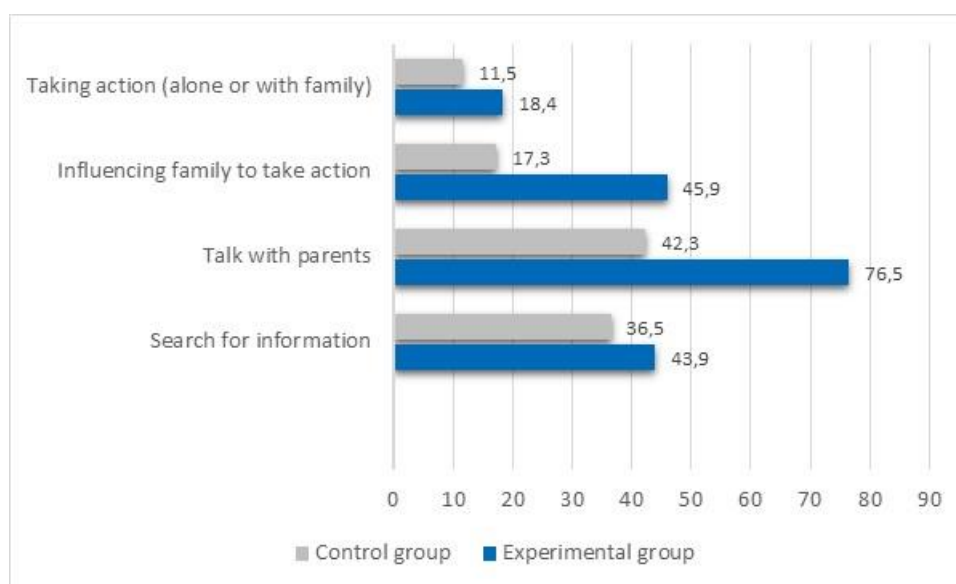


Figure 8. Actions taken by students along the KnowRisk intervention and after its conclusion (T1 survey)

1.4.5 Comparison T0-T1, by applying PADM

As mentioned above, assessment of KnowRisk intervention in Portuguese case-study was theoretically oriented by Weinstein's Precaution Adoption Process Model (PADM, *op. cit.*). Our aim was to be able to identify the stage at which our sample was both in terms of *perceived susceptibility towards seismic risk* and *perceived efficacy of protection*. Hypothetically, KnowRisk intervention would act as stimulus inducing on stage changes.

The analytical procedure adopted to identify the stage at which each individual was a two-step procedure, based on an in-depth summarised in the above sections followed by the construction of indices. An indice is a new variable built through the adequate grouping of a set of indicators through which the concept was operationalized (Ferrando et al. 1986). Two indices were built, corresponding to each of the concepts of PADM, respectively: *perceived susceptibility towards seismic and risk perceived efficacy of protection*. As will be presented below, the four stages of each concept suffered adjustments. The numeric

order (cf. Figure 1 above) associated to each stage was replaced by an adjective that intends to express a specific type of attitude toward seismic risk of seismic protection.

The indice corresponding *perceived susceptibility towards seismic risk* was built on the basis of the following indicators: perceived probability of occurrence of an earthquake in Lisbon, salience of concern and perceived vulnerability towards earthquake impacts. As Table 8 shows, through indice building procedure four type of individual attitudes were stabilised into a typology, respectively: *the unaware*, *the unbelievers*, *the optimistic believers*, *the believers*. A distinction is made between those that manifest ignorance or don't believe on seismic threat in Lisbon and those who believe on it. Among *the believers*, a distinction is made between those who are optimistic concerning their own vulnerability and those who manifest some degree of risk personalization and find themselves vulnerable.

The indice corresponding to *perceived efficacy of protection* was built on the basis of the following indicators: general attitude towards seismic protection, perceived need of taking precautions in Lisbon, detailed protective behaviours and actions taken (search for information, talk, influence, implement protection).

As indicated in Table 9, four types of attitudes toward protection were typified, respectively: *the unaware of protection*, *the unbelievers on protection*, *the believers* and *the active believers*. This typology stands on a general distinction between those who are not aware of protection and those who reveal awareness and positive beliefs towards it. Among *the believers*, we made a distinction between those who influenced others to take protective behaviours, but never implemented anyone, and who influenced others and revealed some proactiveness implementing took some kind of protection (in the recent past).

Table 8. Typology concerning perceived susceptibility towards seismic risk

Types	Definition	
1. <i>The unaware</i>		Individuals that manifest not knowing nothing about earthquake risk.
2. <i>The unbelievers</i>	2.1 Low salience	Individuals that don't think, worry or fear seismic risk; perceived earthquake probability of occurrence as low; and are convinced that an earthquake won't affect them much.
	2.2 Median salience	Individuals that think or worry about seismic risk once a while but perceived earthquakes as low probability events; and are convinced that an earthquake won't affect them much.
3. <i>The optimistic believers</i>	3.1 Low salience	Individuals that don't think on seismic risk, although worry about it; perceive earthquakes as events that are probable to occur; but are convinced that an earthquake won't affect them much.
	3.2 Median salience	Individuals that think and worry with seismic risk; perceive earthquakes as events that are probable to occur; but are convinced that an earthquake will cause more damage for other than to themselves.
4. <i>The believers</i>	4.1 Low salience	Individuals who don't think on seismic risk, although worry about it; perceive earthquakes as probable or highly probable to occur; are convinced that an earthquake will equally affect others and themselves.
	4.2 Median salience	Individuals who think and worry about seismic risk; perceive earthquakes as probable or highly probable to occur; are convinced that an earthquake will equally affect others and themselves.

Table 9. Typology concerning *perceived efficacy of protection*

Types	Definition	
1. <i>The unaware of protection</i>	1.1 Total ignorance	Individuals that don't know if it is possible to do something to protect; don't know if protection as necessary in Lisbon; never searched for information, never talked or implement any action.
	1.2 Ignorance	Individuals that think it is possible to do something to protect; refer one disaster-response behavior; don't see protection as necessary in Lisbon; never searched for information, never talked or implement any action.
2. <i>The unbelievers on protection</i>	2.1 Almost ignorant about protection	Individuals who think it is possible to do something to protect; refer more than one disaster-response behavior; don't see protection as necessary in Lisbon; never searched for information, never talked or implement any action.
	2.2 Unbelievers	Individuals who think it is possible to do something to protect; refer more than one disaster-response and risk mitigation behaviors; see protection as necessary in Lisbon; have already searched for information or talked about it with family members but didn't tried to influence or took any action.
4. <i>The believers on protection</i>		Individuals who think it is possible to do something to protect; refer more than one disaster-response and risk mitigation behaviors; see protection as necessary in Lisbon; have already searched for information, talked about it and tried to influence their family members about it but didn't take any action.
5. <i>The active believers</i>		Individuals who think it is possible to do something to protect; refer more than one disaster-response and risk mitigation behaviors; see protection as necessary in Lisbon; have already searched for information, talked about it with family, tried to influence them, and implemented (alone or with family members) at least one protective action.

Once explained the methodological procedure concerning the operationalization of PADM, there are two questions to be answered: In which stage was our sample before KnowRisk intervention? Were there any changes, that could assigned to the intervention, afterwards?

Data analysis revealed that our sample was, before the KnowRisk intervention, split between *unware-unbelievers* and *optimistic believers-conscious* in earthquake threat. The *unbelievers* were mostly individuals who have heard about earthquake threat in Lisbon but didn't believe much on it (30,1%). The believers were, special in the Experimental Group, divided between those who were optimistic, not believing in their own vulnerability, and those who were conscientious about the threat and their own vulnerability. Concerning *perceived efficacy of protection*, T0 survey data analysis revealed that more than a half of subjects were ignorant about the alternatives of seismic protection or didn't believe much on them. With a few exceptions, the pattern is similar for individuals belonging to the Experimental Group and to the Control Group (cf. Figure 9).

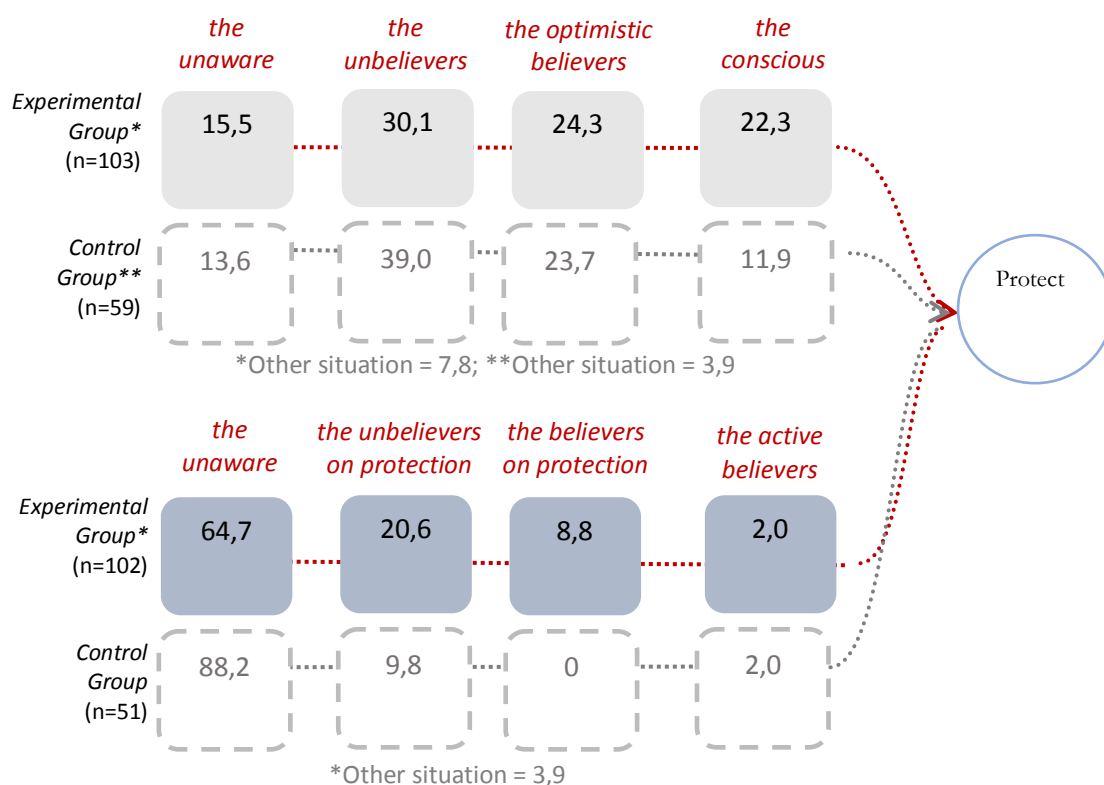


Figure 9. PADM stages in T0 survey

Comparison between T0 and T1 showed relevant changes on trends concerning *perceived efficacy of protection*. As seen through Figure 10, the volume of *the unaware* about protection falls in Experimental Group from 64,7% to 21,4. This trend does not occur with Control Group. Further, the volume of *believers on protection* raises from 8,8% to 27,6% as well as the volume of *active believers* (from 2,0% to 15,3). Once again, such trend is not verified in Control Group. In this scenario, it is plausible to associate the observed changes to KnowRisk intervention.

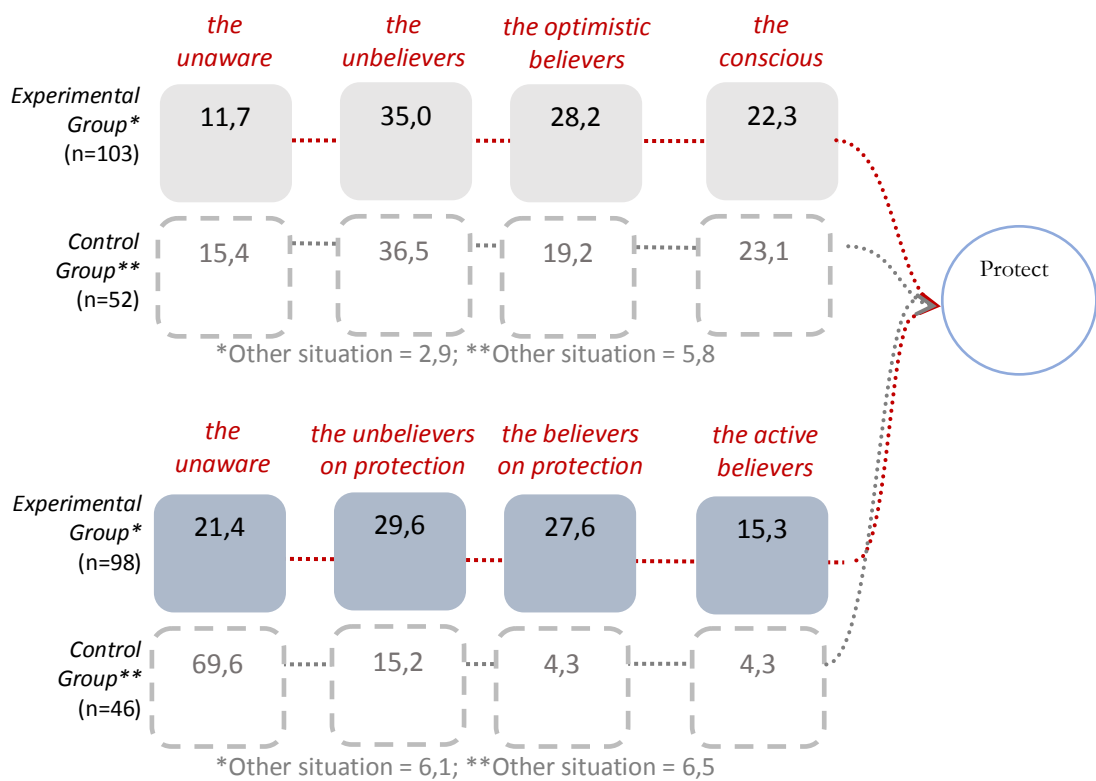


Figure 10. PADM stages in T1 survey

Another aspect that reinforces the above-mentioned change concerns the quantitative relevance, described in the previous section, of references in T1 survey to non-structural risk mitigation behaviours.

In what concerns to *perceived susceptibility towards seismic risk*, only slight changes were observed, not being plausible to attribute such variation to KnowRisk intervention. In T1 survey a similar split was found in our sample, by comparison with T0 survey, between *unware-unbelievers* and *optimistic believers-conscious* about earthquake risk. A slight decrease of the *unware*, jointly with an increase *the unbelievers* and the *optimistic believers*, is found in Experimental Group. As shown in Figure 9, trends in Control Group reveal a slight decrease in T1 survey of *the unbelievers* and the *optimistic believers*, but such decrease is accompanied by an increase of *the conscious*.

Two main reasons may explain the low variation in *perceived susceptibility towards seismic risk*. We refer, on the one hand, to the fact that a half of the teenagers had already some degree of risk awareness and elementary knowledge about earthquake issue in Lisbon before the KnowRisk intervention. In fact, one of the first empirical insights that the

KnowRisk team had from the field, immediately after the KnowRisk intervention, concerned with the impression that targeted-teenagers had more information about earthquake threat than expected by the research team. On the other hand, the weight of seismic protection information in the structure of KnowRisk intervention was higher, with more hours devoted to issues of seismic protection than those concerned with earthquake risk related information.

1.5. Survey in the Italian case-study

Risk communication in the Northern Italy, Naples and Mt Etna pilot-areas covered 10 schools, 40 classes and approximately 913 students of the 8th–10th grades aged 11–19 years old (cf. Table 10). The intervention was structured into a set of activities included as part of the curriculum of science. The protocol of KnowRISK intervention (Piangiamore et al., 2017) was the same in all schools and lasted throughout the whole project. The ItaQ was applied to both experimental group and control group at T_0 and T_1 in each school where the KnowRISK intervention was applied.

Table 10. The Survey in Italy

<i>Middle Schools (ISCDE 2)</i>				
<i>Location</i>	<i>Name</i>	<i>N° Classes</i>	<i>Level</i>	<i>N° Students</i>
La Spezia city	J. Piaget	10	III	201
La Spezia city	U Mazzini	4	III	96
Lerici (La Spezia)	F. Poggi	2	III	45
S. Terenzo (La Spezia)	P. Mantegazza	1	III	21
Laveno Mombello (Varese)	G. B. Monteggia	6	III	130
Catania, Sicilia	San Domenico Savio	3	II-III	45
<i>High Schools (ISCDE 3)</i>				
La Spezia city	A. Pacinotti	3	IV	81
Sarzana (La Spezia)	T. Parentuccelli-Arzela	5	I	140
Varese	Sacro Monte	4	III-IV	80
Napoli, Campania	Liceo Scientifico	2	IV-V	74
Total		40		913

1.5.1 Experimental design and administration

To assess the risk communication strategy in Italy was undertaken an experimental before and after approach. The before-and-after design offers better evidence about intervention effectiveness than the other non-experimental designs. In this situation, the evidence

would be strong that the training caused the increase in test score. Another way of saying this is that the evidence of causality would be strong. Besides the training, little else over the course of the day (interval of time) could have caused the observed increase in knowledge, provided of course that we do not use an identical test on the two occasions and give the group the answers in the meantime (Christensen, L. 1988; Mitchell, M., & Jolley, J. 1988).

1.5.2 T1 data

At the time T1 (after the actions of the project), following the same reasoning applied to T0, we again consider both versions of the questionnaire Q1 and Common (see Table 11), on condition the questionnaires were completed after the actions of the project.

Table 11. The different versions of the KnowRisk project's Questionnaires

Version	Nickname	Sample	Period
First Version	KR-Q0	167	2016-March 21 to 2016-May 12
Second Version	KR-Q1	355	2016-Nov 9 to 2017-June 6
Third Version	KR-CommonQ-Ita	491	2017-Feb 24 to 2017-Sept 29

1.5.3 Comparison T0-T1 – Description of the samples

Summarizing, in this report we use the data collected at T0 and T1 both with the Q1 version and with the Common version of the questionnaire, analysing a total of 821 questionnaires.

In total we have a sample of 821 students of which 401 males and 409 females, 11 of them prefer don't declare gender. Their ages are distributed as shown in Table 12.

Table 12. Distribution of students by age (N=821)

Quest- Version	11	12	13	14	15	16	17	18	19	Total
Q1	0	14	128	137	46	5	0	0	0	330
Common Q-Ita	4	37	195	145	19	0	13	65	13	491

The geographical distribution of the sample is shown in Table 13.

Table 13. Geographical distribution of the sample

Quest- Ver	Lombar dia	Liguria	Toscana	Campania	Sicilia	Other regions	Total
Q1	0	315	13	0	0	2	330
Common	264	76	0	91	60	0	491

It should be noted that both questionnaires (Q1 and Common) present a sample loss at the time of T1. This is due to the fact that in many cases the retest was carried out by the classes with the teachers without the presence of those who had carried out the actions with the class. Table 14 shows the loss percentages at T1.

Despite its brevity Table 14 show that the Common questionnaire compared to the Q1 has a greater loss at T1.

Table 14. Losses of the sample between the T0-T1 administrations

Questionnaire Version	Administration distance between T0 and T1 (dd)	T0	T1	Total	Difference between T1 and T0	%
Q1	105	228	102	330	-126	-38,2%
Common Q- Ita	62	396	95	491	-301	-61,3%
		624	197	821		

Comparison T0-T1 – Section Earthquake experience and perception

Regarding the questions related to the previous experiences of an earthquake, the comparison between data shown in Figure 11 indicates that in the Q1 results are more stable respect to the Common Q-Ita.

We must remember, however, that the questions asked to the students regarding the past experience of an earthquake were different in the two questionnaires:

Common - What is the strongest earthquake you have experienced? Answers: not felt; weak (felt light trembling); fairly strong (windows rattle but no damage); strong (vibration, objects topple); damaging (building suffer damage); destructive (buildings collapse)

The earthquake is an event ...? Answers: That you've never experienced directly-That you have experienced directly, by a Likert scale to 7 points (1, you've never tried it, 7 you've tried it intensely).

To compare the answers of the two questionnaires we considered the score 1 equivalent to not felt, grouped the scores from 2 to 5 as weak and fairly strong and considered the scores from 6 to 7 equivalent to strong, damaging, destructive. The differences between the two questionnaires can also be interpreted on the basis of the geographical location of the sample and the level of seismic hazard. Looking at Table 13 we can see that the Common Q-Ita was compiled mainly in Lombardia (n = 264).

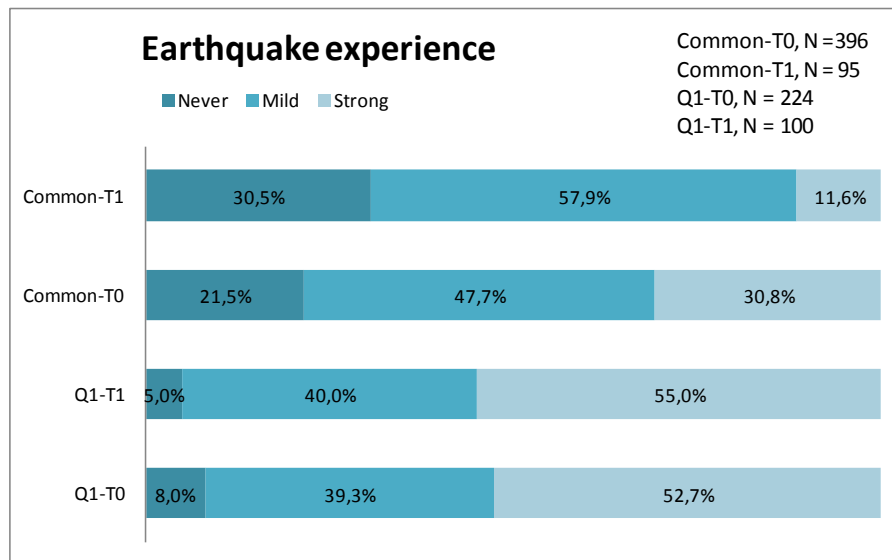


Figure 11. Comparison between Earthquake experience in the Q1 and Common_Q at T0 and T1

With all the cautions of the case, however, the Common Q-Ita seems to show a significant decrease in experience related to strong and destructive earthquakes between T0 and T1 (about 10% less) and this suggests a reconsideration of the experience.

The Figure 12 shows the comparison between T0 and T1 groups for the version Q1 of the questionnaire (N=334) and the Common Questionnaire (N=491). In general, the data show that in both questionnaires there is a slight improvement in perception at T1. However, there are some differences between the results produced by the two questionnaires to be emphasized. In the Q1 version the perception of the T1 group increases clearly for the predictable-unpredictable scale, plus 0.46, and for the scale low risk-high risk, plus 0.29.

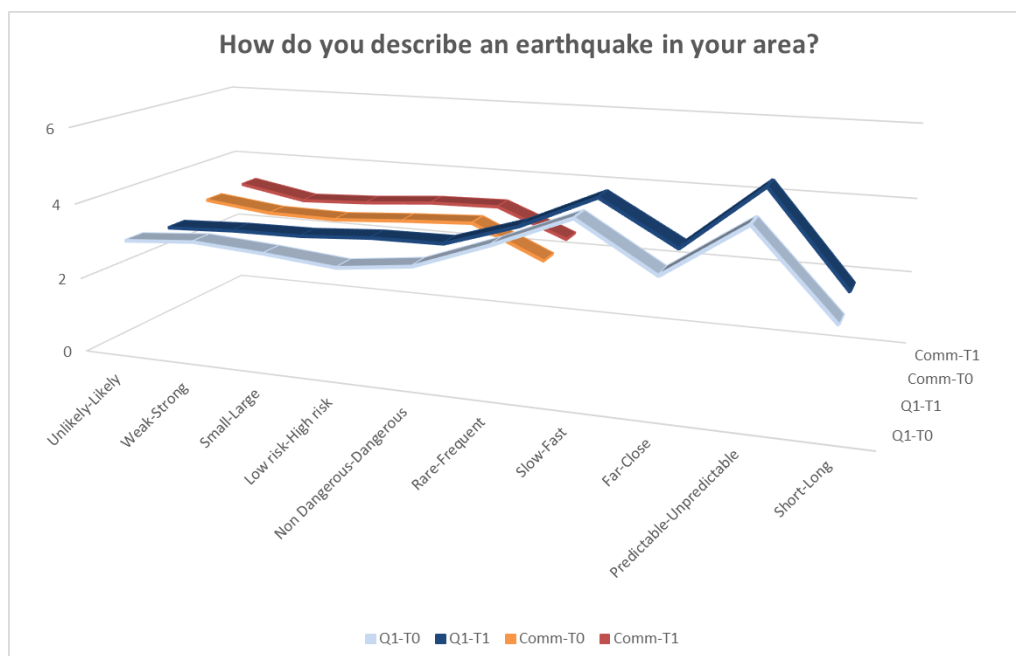


Figure 12. Comparison between earthquake perception in the T0 and T1 groups for the Q1 and CommonQ

The Figure 13 shows the comparison between the safety perception of the school for the Q1 and Common Q samples at T0 and T1. At T1, for both groups there is a lowering of the sense of security that is attributed to the school, and this lowering is again more evident in the Q1 sample.

Figure 14 shows the answers to the question “If an earthquake occurred, what would happen to your school?” comparing the Q1 questionnaire with the CommonQ. The responses of the two groups at T1 are always higher than the T0, and this fact leads us to think that the actions of the project have had a positive impact on the perception of the effects that could occur in a school when an earthquake occurs.

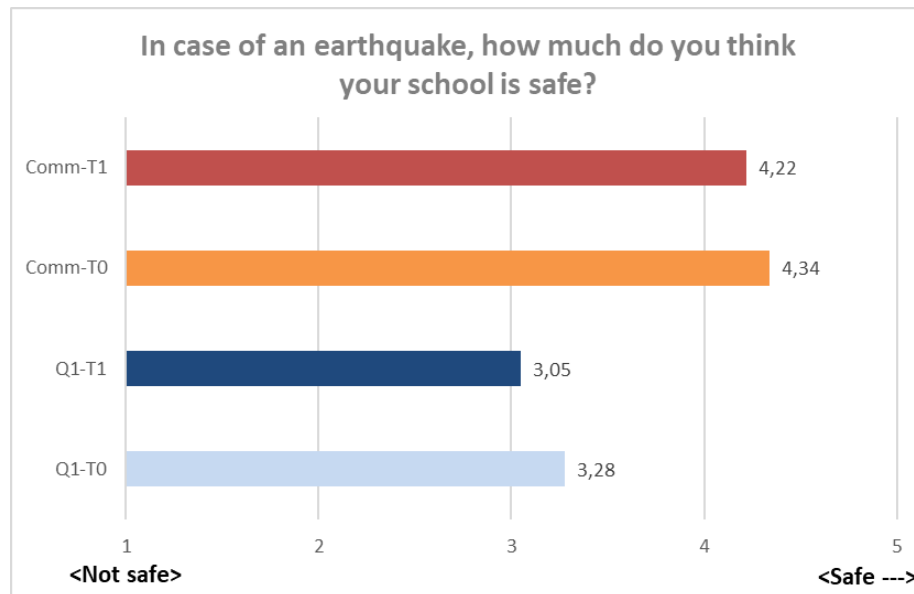


Figure 13. Comparison of the safety perception of the school in the T0 and T1 groups for the Q1 and the CommonQ

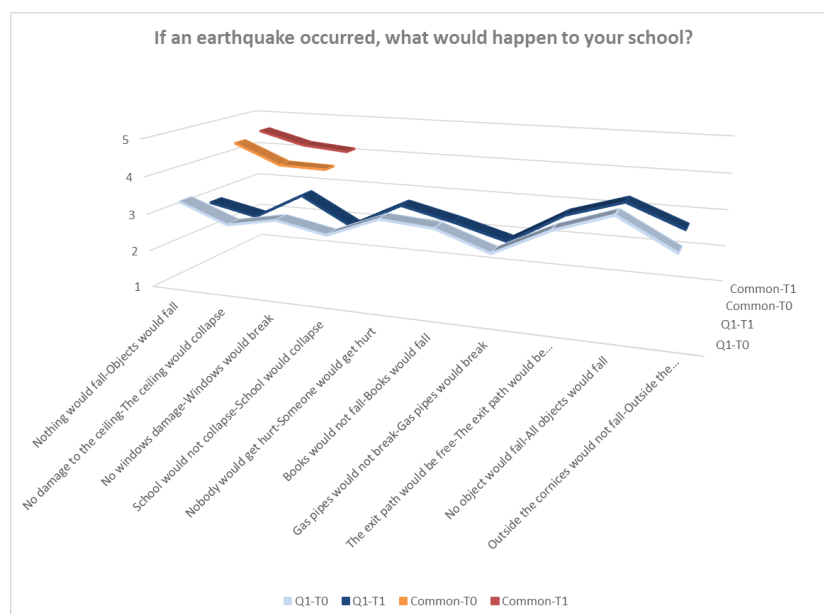


Figure 14. Comparison of the perception of the school in the T0 and T1 groups for the Q1 and the CommonQ

Comparison T0-T1 – Section Knowledge

With respect to the sections on the knowledge of the Q1 and Common questionnaires, we present some results related to the Common questionnaire. Figures 15 and 16 show results about seismic risk knowledge and earthquakes in the area. In both cases the results of the T1 groups are better than T0.

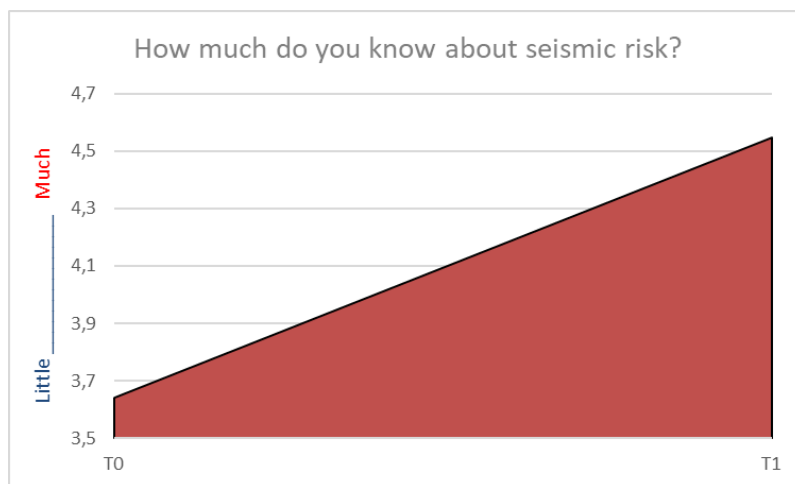


Figure 15. Comparison of the perception of the school in the T0 and T1 groups for the Common questionnaire ITA

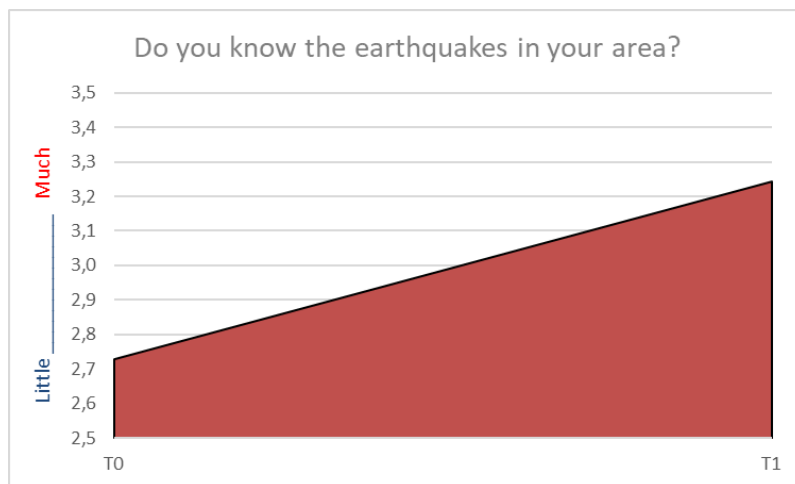


Figure 16. Comparison of the perception of the school in the T0 and T1 groups for the Common questionnaire-ITA

Regarding the sources from which students are informed (Figure 17), the group of T1 students shows a significant increase in the "School" source which grows by 14%, while TV (-5%) and the Internet and social media (-8%) decrease.

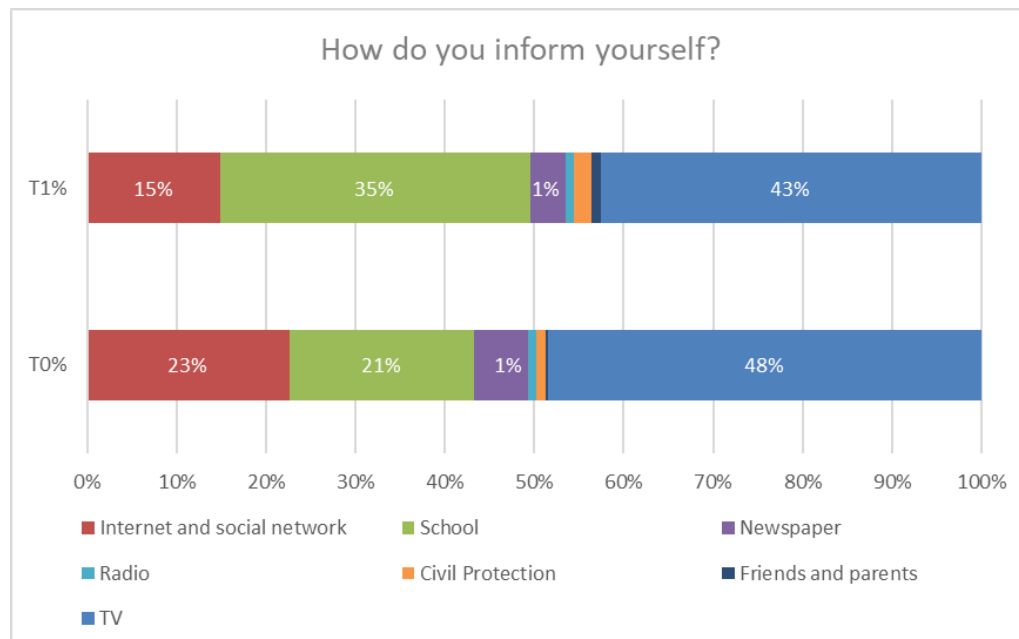


Figure 17. Sources of information on earthquakes

Comparing the results between the T0 and T1 group for the question "You have participated in information campaigns on the reduction of seismic risk" (Figure 18), there is a significant difference in favour of the T1 group (plus 41%). In addition, among those students who participated in awareness campaigns, those of T1 claim to have actively participated in 70% of cases (Figure 19).

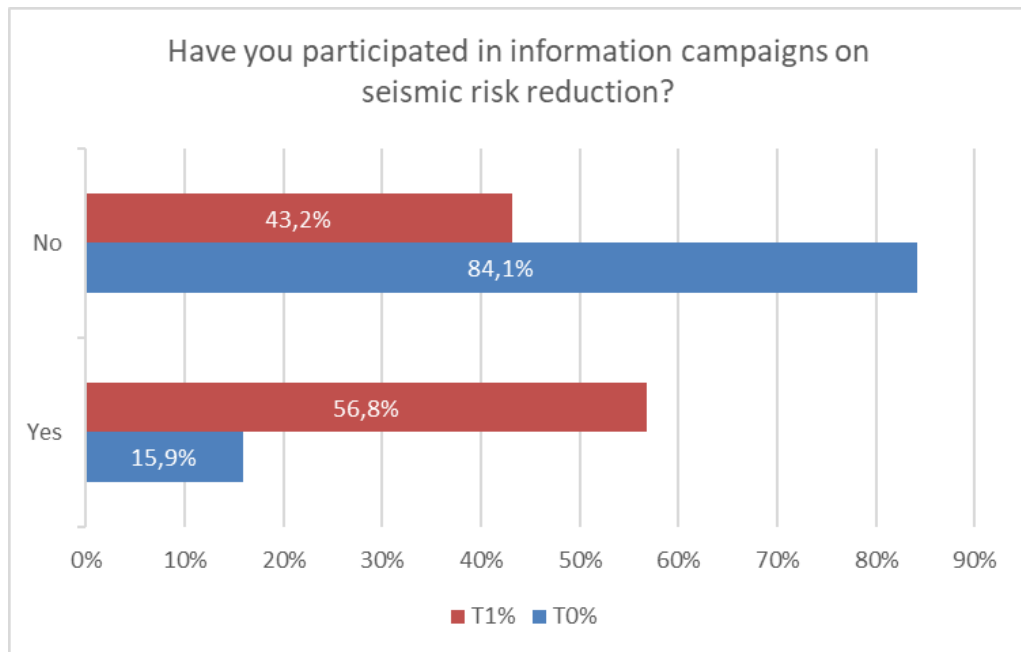


Figure 18. Participation in information campaigns

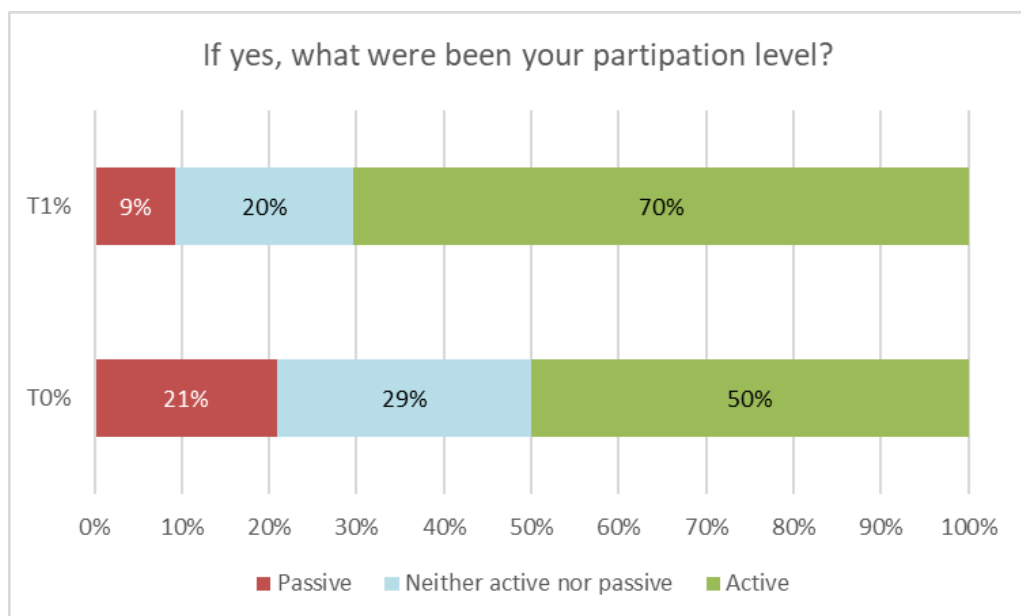


Figure 19. Level of participation

The answers to the question “Who is responsible for ensuring the safety of your home” are varied and controversial (Figure 20). In general, we can emphasize that the results indicate that groups of students have difficulty taking responsibility for the safety of their home. In fact, while on the one hand the T1 group shows slightly better results than T0 to the answer "You and your family", which grows by 6.3%; on the same time the T1 group attributes a greater responsibility to the "Government" that grows by 7.5%.

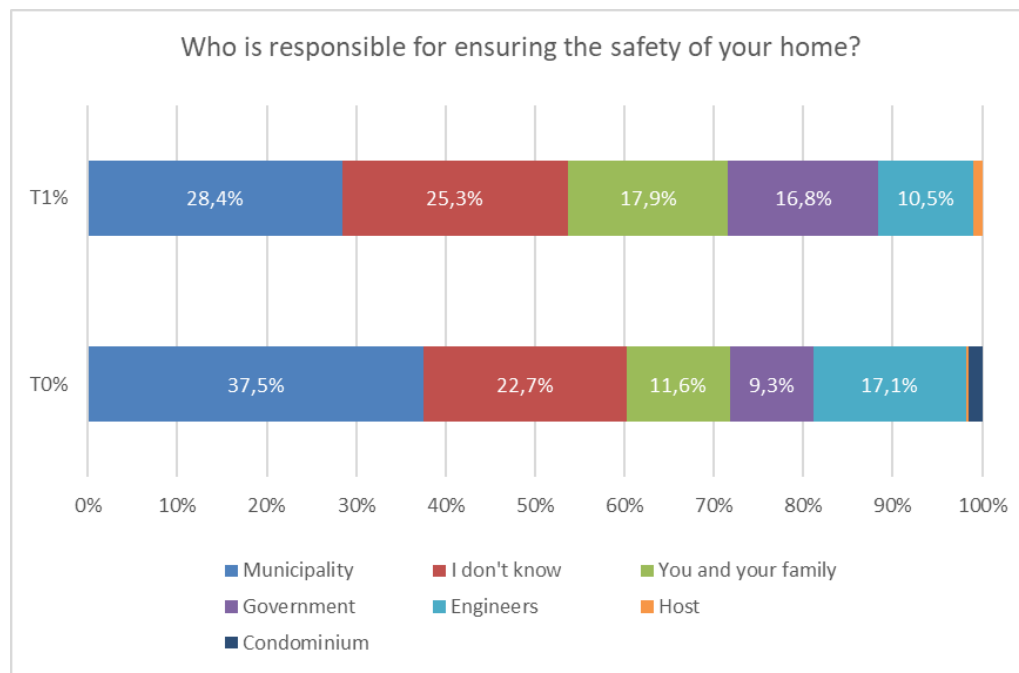


Figure 20. Level of participation

Comparison T0-T1 – Section “Actions of prevention?”

We consider now the section of the Common Questionnaire called "Action of prevention", related to the propensity of students to take actions to reduce the seismic risk. The principal question of this section regards the actions realized to reduce the risk. Figure 20 shows the comparison between the T0 and T1 groups of students. Can be noted that the percentage of students of T1 group that did nothing to prevent risk drastically reduce from 34% to 16%. Consequently, an increase in all the preparatory actions for risk reduction is noted: “talk to friends” (plus 6.5%); suggest parents to act (plus 6.1%); put in place preventive measures (plus 5.4%).

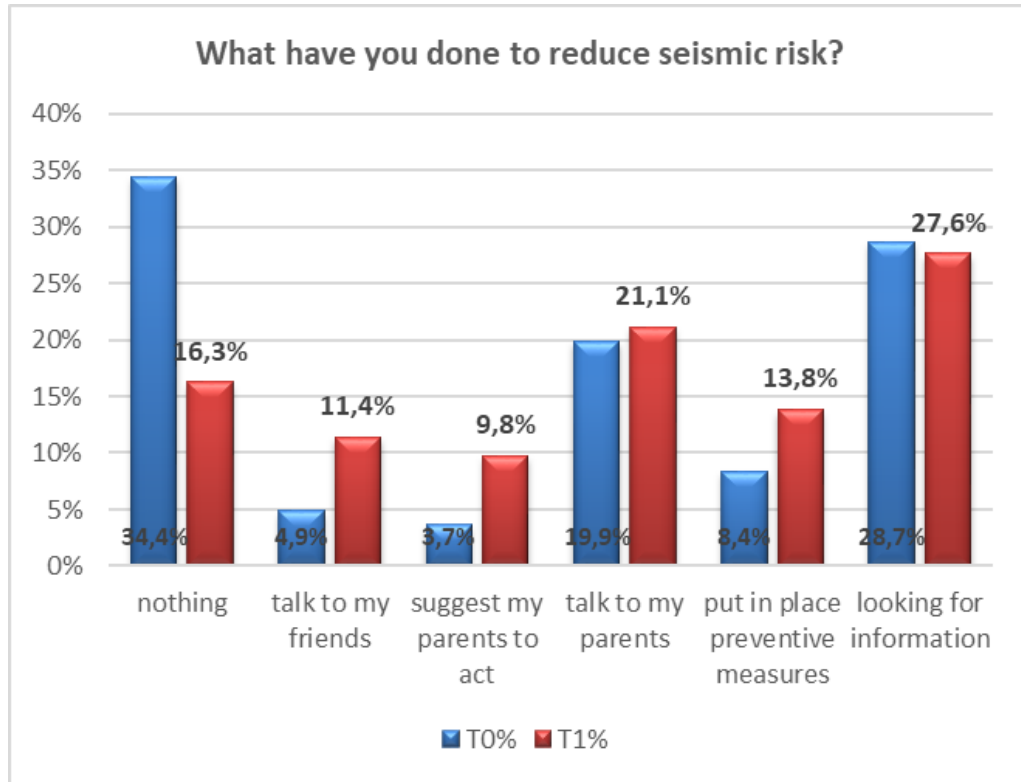


Figure 21. Comparison between T0 and T1 groups about actions to reduce risk.

The best ability to identify and adopt preventative measures to reduce the risk is confirmed by the T1 group responses compared to the T0 group (Figure 21).

Figure 22 shows that some correct actions in the T1 group increments with respect to T0. In particular, this trend concern the actions that regard non-structural elements: “place the heavy object down”, “securely fasten the wall shelves, bookcases...”, “move the beds”, “know in advance where are located water, electricity and gas taps...”, “get ready a battery radio and flashlight”, while the instinctive behavior “to come out the house” show a decreasing trend.



Figure 22. Comparison between T0 and T1 groups about actions to reduce risk

Figure 23 shows a general decrease of the scores regarding difficulties to adopt preventive measures. Figure 22 shows a general decrease of the scores regarding difficulties to adopt preventive measures. In particular, the T1 group shows a 7.3% decrease in obstacles to take preventive measures.

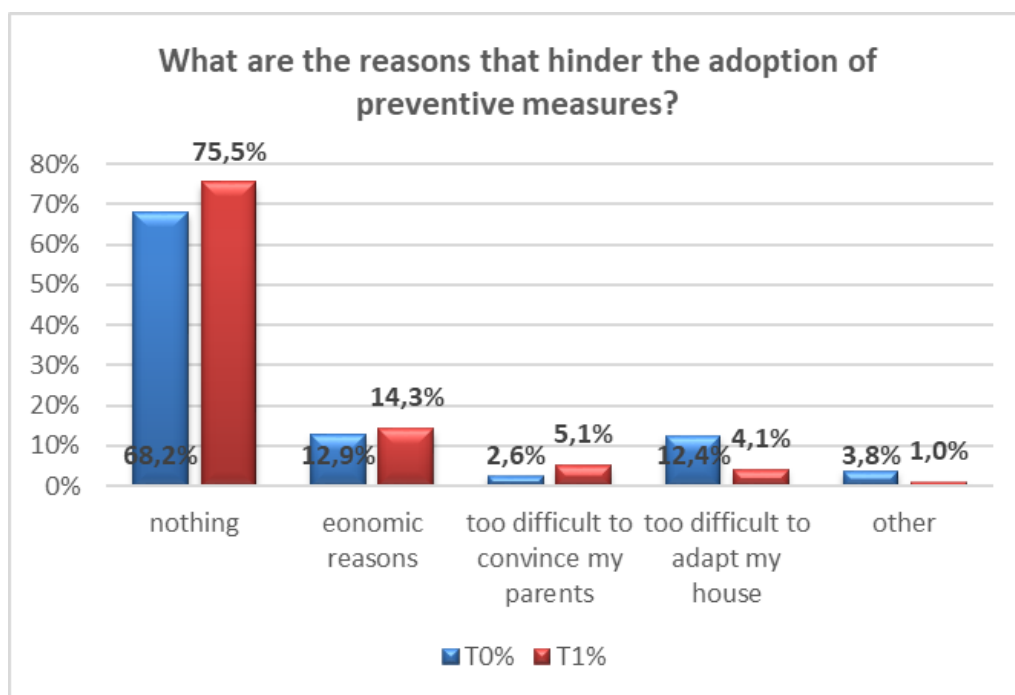


Figure 23. Comparison between T0 and T1 groups about obstacles to the adoption of preventive measures to mitigate risk.

1.5.4 Discussion

In general, both the data of the common q and the Q1 version of the Italian questionnaire showed that the group of students improved in perception, knowledge and actions at the time T1. We therefore have some data to state that, in the pilot areas in Italy, the Know Risk project was effective in reducing the seismic risk.

It would be very interesting to repeat the common questionnaire to the same students at a distance of one year, to understand if the improvements we have observed are stable over time or if on the contrary they are volatile improvements and subject to being thwarted by the passage of time.

In this regard, it must be remembered that earthquakes sometimes occur after a few decades or hundreds of years and therefore actions to reduce their impact must be evaluated over a period of several years and generations.

1.6. The Survey in the Icelandic case study

1.6.1. Experimental design and administration

Survey in Iceland was conducted in a school in Selfoss, in the South Iceland Seismic Zone. The name of the school is Sunnuækjarskóla, which is the second largest school in Selfoss. A subset of 63 students from the 8th grade was selected for survey and intervention action.

The approach in Iceland was similar to that in Italy and Portugal. The surveys were carried out before and after intervention/communication actions. The one before intervention is termed as T0 and the one after intervention is termed as T1. The common questionnaire developed in the project, with slight modification for the local context in Iceland was used for the surveys. Both the surveys used the same questionnaire. The surveys were administered by the teachers of the school. Printed copies of the surveys were given to the headmaster of the school. The students filled in the questionnaires in presence of their teachers. The questionnaires were then collected and processed digitally.

1.6.2. T0 data

The data obtained from the T0 survey is called as T0 data in this report. The survey was carried out in the first week of April 2017, a week before the intervention action was carried out in the school (see deliverable report E3). The total number of questionnaires answered in this survey was 40. The questionnaire was not given to all the students participating in the intervention action. However, the T1 survey was given to all the students participating in the intervention action. This was done to test if exposure to the questionnaire before intervention causes better learning during the intervention.

1.6.3. T1 data

The data obtained from T1 survey is called as T1 data in this report. The survey was carried out in November 2017, seven months after the T0 survey. The sample consisted in 40 students in T0 survey and in T1 survey 63 students. Students who participated on T0 survey were also inquired in T1 survey and all of them benefited from KnowRisk

intervention action.

1.6.4. Comparison T0-T1

This section presents salient features of the T0 and T1 data and a comparison between them. The age distribution of the respondents in the two surveys is shown in Figure 24. The students are almost equally distributed in age 13 and 14 during T0 survey. At the time of T1 survey, many of the students have grown older to 14 years.

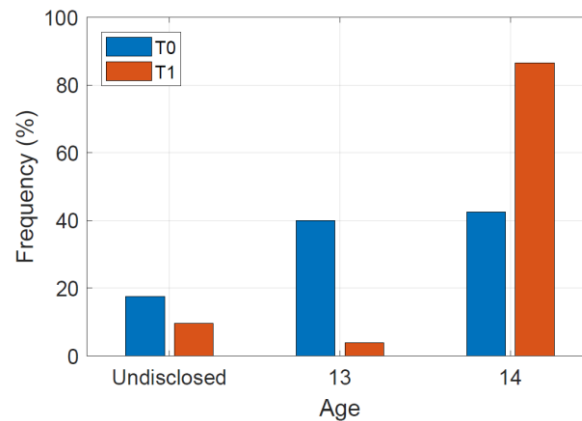


Figure 24. Age distribution of respondents of the T0 and T1 survey.

The gender distribution of respondents is shown in Figure 25. There are slightly more female students than male, with the corresponding percentage being approximately 60 and 40, respectively.

The response of the students to the questions “What would happen in your home if there was a mild earthquake” is shown in Figure 26. The severity is measured on a scale of 1 to 7. The students expect low damage in ceilings and windows during mild earthquake. However, they see movement of objects inside their house to be more likely. This response is almost identical at T0 and T1. The response to the question “What would happen in your school if there was a mild earthquake” is shown in Figure 4. The students seem to think of school as being more vulnerable than home. The difference in the severity of damages assigned to the home and school environment, however, is very small and could be due to random chance.

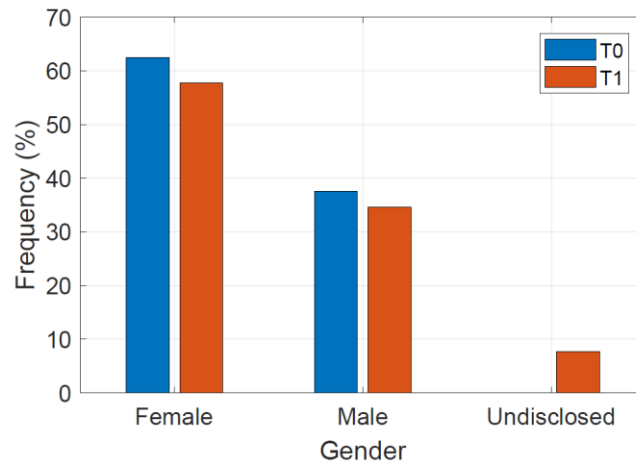


Figure 25. Gender distribution of respondents of the T0 and T1 survey.

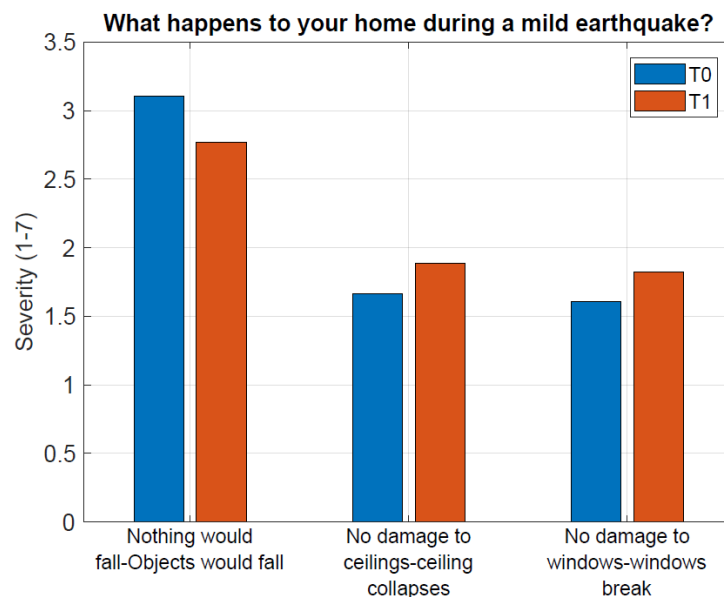


Figure 26. Response to the questions “What would happen in your home if there was a mild earthquake?”

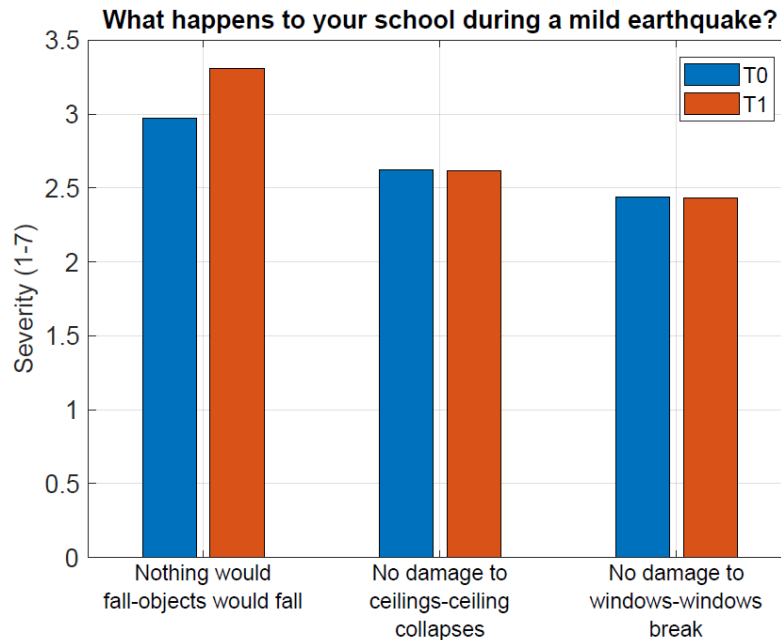


Figure 27. Response to the questions “What would happen in your home if there was a mild earthquake?”

We next compare the students response to preventative actions in the T0 and T1 surveys. Some of the results are shown in Figure 28 and Figure 29. Importance is measured in a scale of 1-7 and average importance for each action is shown in the figure. The students assign rather high importance to the actions. There is significant increase in the importance assigned to these actions by the students before and after intervention.

The next question being addressed is “What have you done to reduce seismic risk?”. Summary of response to this question is presented in Figure 30. Multiple answers were allowed in this question. The results show that a considerable proportion of students have not taken any action. This is perhaps expected given their young age. However, there seems to be a reduction in the proportion of students who responded with “nothing” between T0 and T1. This is significant rise in the proportion of students who talked to friends or parents between T0 and T1. The intervention action therefore appears to have been successful in starting conversation of the students with their friends, which is an important step towards risk reduction. The proportion of students talking with their parents about seismic risk did not increase much between T0 and T1. This is undesirable, because this action could be more effective in convincing the parents to take preventative measures.

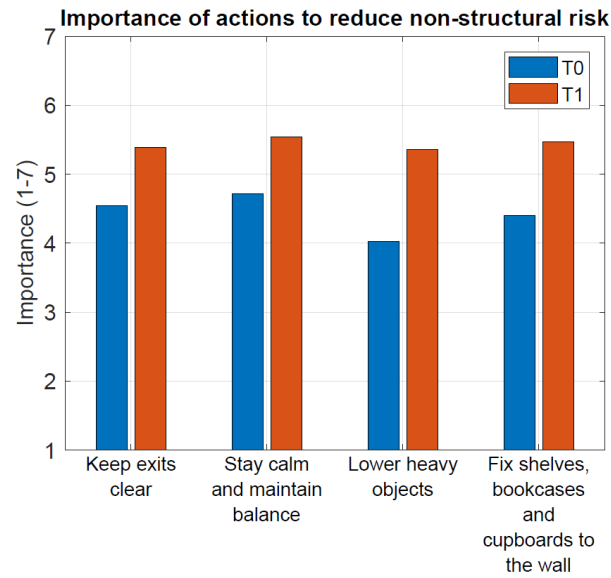


Figure 28. Response of the students to the importance of preventative measures.

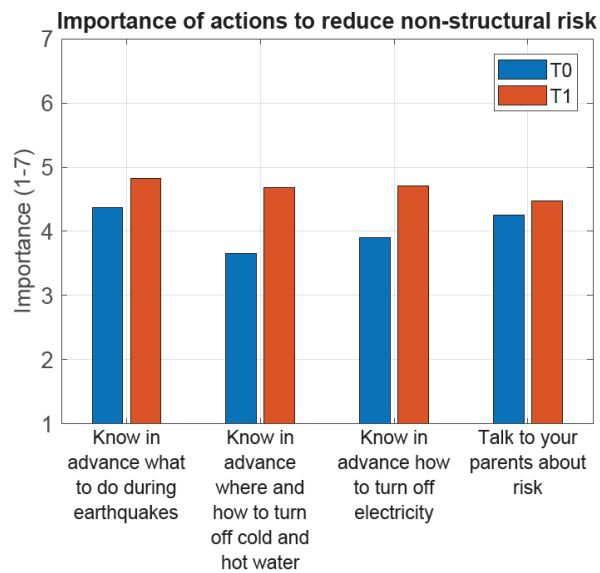


Figure 29. Response of the students to the importance of preventative actions.

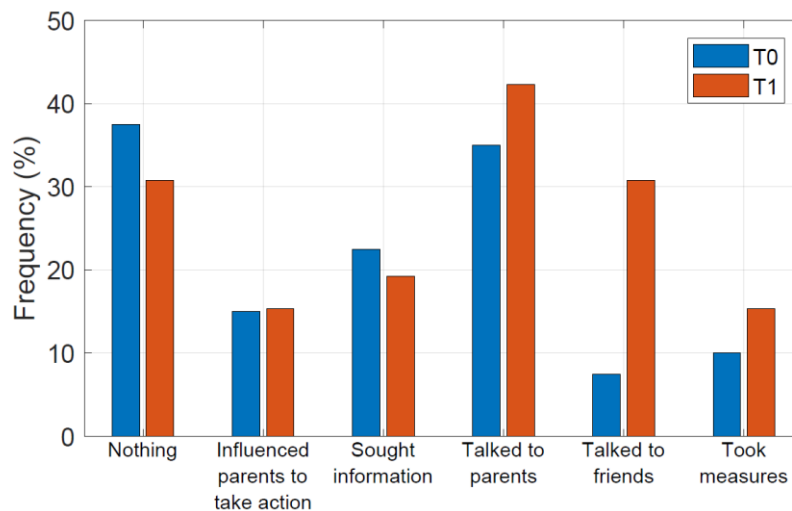


Figure 30. Response to the question “What have you done to reduce seismic risk?”

We next examine the response in terms of the likelihood of different actions that the students or their family would take. The likelihood is measured on a scale of 1-7 and average values for each action are shown in Figure 31. There is slight increase in the likelihood assigned to “move furniture that could block exits” and “move heavy objects and secure valuables”. The increase, however, is not so large. The perceived likelihood of getting a builder to anchor furniture to the wall does not change significantly between T0 and T1. There could be two reasons for this. The first is that, these actions were emphasized to be “Do It Yourself (DIY)” during the intervention. The second reason is that there is a very strong DIY culture in Iceland when it comes to home improvement.

We finally present the results regarding what the students perceive as difficulties or obstacles in taking preventative actions. The results are presented in Figure 32. The main observation is that a large majority of students perceive no difficulty in implementing protection measures. Perceived difficulty seems to have reduced after KnowRISK intervention.

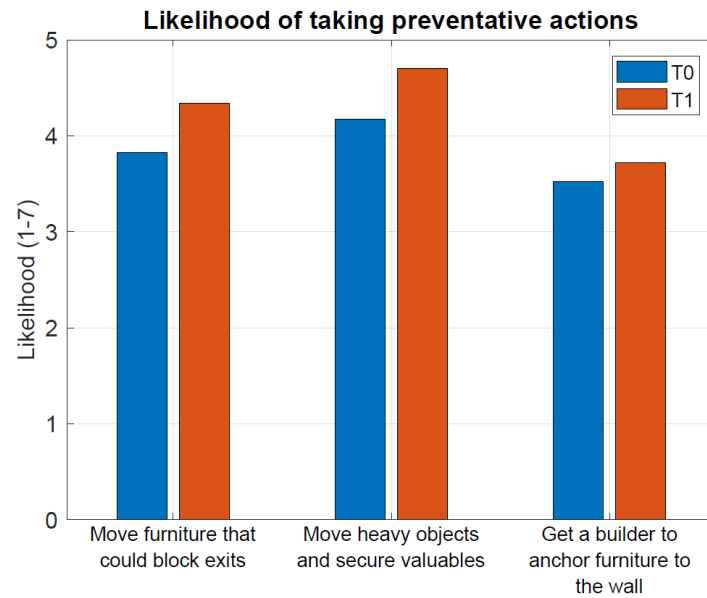


Figure 31. Likelihood of the students and their families taking different preventative actions.

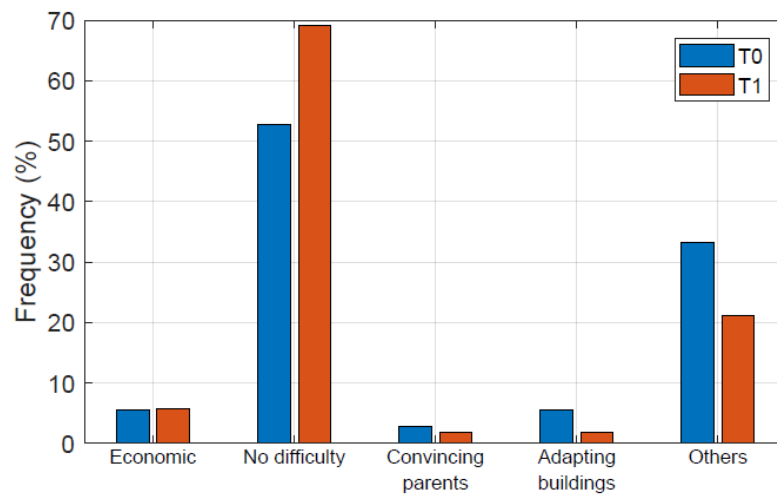


Figure 32. Difficulties perceived by the students in implementing measures to reduce seismic risk.

2. FINAL REMARKS

Seismic risk communication is often tackled in a well-intended way but also surprisingly ad hoc. It does not always stand on prior knowledge about people's needs and target-areas nor on solid evidence about message impacts on targeted publics.

KnowRISK project was structured in order to allow a knowledge-base when structuring risk communication and risk-information tools and, also, to allow an evaluation of its impacts. Such evaluation intended to become an opportunity for learning with experience and refine future risk communication.

As seen through this document, an evaluation research procedure was adopted in the three knowRisk target-areas. Italy and Portugal adopted specific research designs that were, afterwards, taken as the basis for the conception of a common inquiry instrument. This instrument, in the form of a questionnaire, was adopted in Iceland case-study and in some cases of Italy case-study.

Along KnowRisk project the team tested an evaluation research design, qualitative and quantitative methods and inquiry tools. It was a rich learning process that gives a theoretical and methodological basis for future developments.

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