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The structure of risk perception: A comparative study.

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1) Introduction.

Understanding public perceptions of risk is increasingly considered to be important in order to make sound policy decisions. Psychologists and other social scientists have shown how individuals judge and evaluate hazards related to working conditions, private activities, technological developments, global ecological changes, and so on. The main issues are the subjective concepts underlying risk judgements, the determinants of perceived risk magnitude, and differences among societal groups or cultures. The "psychometric paradigm" by Slovic, Fischhoff, and Lichtenstein was a landmark in research about public attitudes toward risks (1,2,3,4,5). Lay people use a broad definition of risk when making their judgements about which ones are of the most concern to them. This conception incorporates a number of qualitative characteristics identified using factor analysis (4). The set of characteristics can be clustered into three factors (2, 4): 1) the dreadfulness of risks, 2) the degree of knowledge of and familiarity with the hazard, 3) the number of exposed people. Several studies repeated this approach (6,7,8,9,10,11,12). Some studies produced a roughly equivalent structure, at least for factors 1 and 2 (7,8,9,10,11,12).

The original proponents of the "psychometric paradigm" have developed more sophisticated approaches that include the influence of factors such as gender, ethnicity, nationality, worldviews, and so on. Although the results were inconsistent, there are frequently some differences related to gender, age, socio-economic status, and educational level.

Since then, some studies were also carried out related to specific hazards, especially on those derived from nuclear energy and from radiation sources in general (13,14).

An interesting line of research, derived from "psychometric paradigm," was the replication of the original study by Slovic *et al*. (2) in other countries. One aim was to obtain comparable results among countries. What guided these comparative attempts was a mixture of goals, first, to test general theory and second, to generate a body of exploratory new knowledge of public opinion in distinct countries. In general, the results confirm the generality of the main factors.

Although some technologies frequently used in the health context (i.e., X-rays) have been studied "as examples of radiological hazards with low risk," no study has used this type of hazards as target. This type of hazards could be considered as voluntary, beneficial to the individuals, and characterised by individual exposure. In this study, our main goal was rating these risks, within a more general set of hazards, similar to those generally used in Risk Perception Research. In accordance with recent investigations, we are also interested in the stability of the risk perception structure throughout different nations, that exhibit different cultural characteristics.

2) The sample

Although eleven countries were involved in the project, data of four of them cannot be presented in this paper. Due to some problems in the codification process, data from Brazil, Colombia, Panama, and Salvador were not available when writing this paper. Further papers will include the whole sample and pertinent comparisons.

A total of 5137 subjects from seven countries (Argentina, Cuba, Spain, Mexico, Peru, Uruguay, and Ecuador) were interviewed. The national distribution of the sample is shown in Table 1.

Table 1. Participants by countries.

COUNTRY	Argentina	Cuba	Spain	Mexico	Peru	Uruguay	Ecuador	Total
Frequency	513	360	1556	1705	372	280	351	5137
Percentage	10,0	7,0	30,3	33,2	7,2	5,5	6,8	100,0

Some demographic variables of the sample were studied in order to analyse individual differences and their representativeness: Gender, educational level, age, and group of patient. The data are summarised in Tables 2 to 5.

Table 2. Participants by gender.

GENDER	Male	Female	Total
Frequency	1937	3151	5088
Percentage	37,7	61,3	100,0

More than 60% of the interviewed subjects were females. There is no clear scientific or medical explanation for this overrepresentation of the females. A possible reason could be found in the willingness to participate in the research. Fieldwork shown that males were more reluctant to collaborate than females.

Table 3. Participants by educational level.

EDUCATIONAL LEVEL	No studies	Primary	Secondary	University	Total
Frequency	139	793	1506	2440	4878
Percentage	2,7	15,4	29,3	47,5	100,0

The educational level of the sample can be described as quite high (at least, considering the average Spanish levels), with 50% of university studies, and 30% secondary studies. It could be argued that the lower educational levels refused more frequently or were not capable of filling in the questionnaire.

Table 4. Participants by age.

AGE	< 20	20-29	30-39	40-49	50-59	60-69	> 70	Total
Frequency	439	1298	1136	1057	648	323	147	5048
Percentage	8,5	25,3	22,1	20,6	12,6	6,3	2,9	100,0

Table 5. Participants by group of patient.

GROUP OF PATIENT	X - Rays	Nuclear Medicine	Radiotherapy	Others	Total
Frequency	2274	415	311	1436	4436
Percentage	44,3	8,1	6,1	28,0	100,0

Half of the sample defined themselves as X-rays patients, followed by “other” patients. Patients of Nuclear Medicine and Radiotherapy Services account for 16% of the total. These rates are similar to those found in medical statistics.

3) The survey

A preliminary version of the questionnaire was designed by the Spanish team and circulated in all the countries for comments. A pilot study was carried out in Spain and Uruguay to check whether it was clearly understood, considered to be meaningful, etc. In both countries, incidental samples of outpatients were used. The pilot study showed it was necessary to shorten the extension of the questionnaire (it was too long), to adapt the language (both in terms of common words and of national peculiarities), and to delete some questions (those that generated anxiety, were not understood, etc.).

The final version was then designed and circulated for final comments until all the countries agreed on it. Contents of the questionnaire are summarised below:

- General risk perception: 22 risks, both technological and nontechnological and, within them radiological and nonradiological ones, to be rated on two scales: possibility and seriousness. All kinds of risks were properly balanced in the list.
- Risk perception of diagnostic and therapeutic radiological applications as a patient
- Conditions for feeling safe (research, legislation, information, etc.): to choose the three most important ones
- Information issues: who should inform, what kind of information should be provided, etc.
- Mood.
- Evaluation of the questionnaire
- Demographic profile

This paper will focus on the questions related to general risk perception.

4) The procedure

A network of national co-ordinators was established for the final design and distribution of the questionnaire. Within each country, a representative of the National Radiation Protection Society was chosen to co-ordinate the research project. When the final version of the research tool was agreed on a set of copies of the questionnaire was sent from Spain to all involved countries. Each national co-ordinator was in charge of the distribution of the questionnaire in his/her country.

The Spanish team prepared a set of instructions to be followed in each country. Guidelines for the sample design, the data gathering processes, and possible incidences during the data gathering were provided

In all the countries, the co-ordinator distributed the questionnaires in the main hospitals with radiological services according to the above-mentioned guidelines. In general terms, a common procedure for the data gathering was adopted, although several differences were unavoidable due to national peculiarities.

Taking into account the national singularities (educational levels, suitability of the waiting rooms, etc.), each national co-ordinator decided the best procedure in his/her country. In most of the countries, the questionnaire was distributed in the waiting rooms, handed out to the patients, and was self-administered. To achieve an acceptable response rate in some countries, such as Cuba, Mexico, Colombia, and Uruguay, it was necessary to use a face to face procedure.

5) Results.

1.- Possibility versus Seriousness.

First analysed the 22 risks from two rating scales: possibility and seriousness, and we examined the differences between them by *Student's-t* contrast for related samples. Table 6 presents the summary of this analysis.

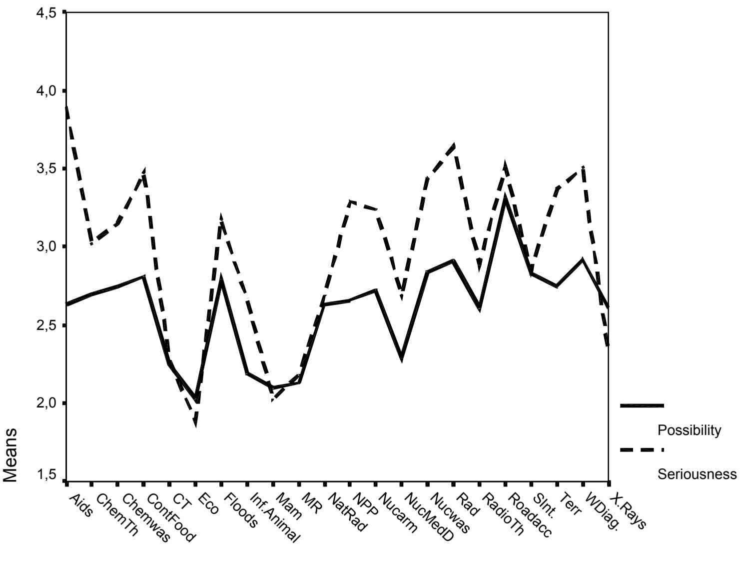
Table 6. Ratings of risks by Possibility and Seriousness.

Source of risk	N	Possibility		Seriousness		Differ.	Correl.
		Mean	S.D.	Mean	S.D.		
AIDS	5203	2.63	1.17	3.90	1.55	-1.27**	.384
Nuclear Med. Diagnostic	5197	2.29	1.19	2.70	1.42	-.40**	.468
x-rays	5199	2.61	1.37	2.32	1.22	.29**	.391
Infection from animal	5197	2.19	1.16	2.67	1.38	-.48**	.458
Mammography	5174	2.10	1.33	2.03	1.30	.07ns	.453
Nuclear arms	5194	2.72	1.55	3.24	1.69	-.52**	.495
Food contaminated rad.	5175	2.81	1.52	3.47	1.67	-.66**	.455
Computerised Tomog.	5189	2.25	1.23	2.27	1.33	-.02ns	.485
Road accident	5192	3.31	1.44	3.51	1.59	-.20**	.560
Nuclear power plant	5193	2.66	1.59	3.29	1.71	-.63**	.470
Magnetic resonance	5199	2.13	1.24	2.18	1.36	-.04ns	.507
Surgical intervention	5203	2.83	1.26	2.85	1.39	-.02ns	.512
Wrong diagnosis	5198	2.92	1.40	3.50	1.62	-.57**	.499
Nuclear wastes	5206	2.84	1.57	3.44	1.70	-.59**	.496
Terrorism	5198	2.75	1.50	3.37	1.70	-.62**	.483
Ecography	5188	2.03	1.31	1.89	1.27	.15**	.432
Chemical wastes	5201	2.75	1.43	3.15	1.59	-.40**	.521
Floods	5204	2.79	1.41	3.17	1.58	-.38**	.520
Chemotherapy	5206	2.70	1.40	3.03	1.59	-.33**	.549
Radioactive escape	5193	2.91	1.65	3.64	1.74	-.73**	.482
Natural radiation	5209	2.63	1.38	2.69	1.45	-.02ns	.554
Radiotherapy	5214	2.61	1.32	2.89	1.52	-.28**	.607

Note: ** : $p < .001$; ns: nonsignificant difference.

The graphical results can be seen in Figure 1.

Figure 1. Ratings of risks by Possibility and Seriousness.



Most of risks showed significant differences between "possibility" and "seriousness," with seriousness always being higher than possibility. This result agrees with the main findings from "optimistic bias" from the "Psychometric paradigm." However, all risks related to health diagnosis present a different profile characterised by nonsignificant differences, and some differences in the other direction. The two sets showed a similar ranking for health related hazards which stayed at the bottom in both, possibility and seriousness. Other radiological risks were at top (nuclear power plants, nuclear wastes, etc.), near road accidents and terrorism. Natural radiation is near health hazards on the two rating scales.

2.- Differences among countries.

We also examined the differences among countries in the risk ratings. Tables 7 and 8 show the results from these comparisons.

Table 7. Means and standard deviations of the 22 sources of risk by countries rated on "Possibility".

Sources of risk	Countries						
	Argentine	Cube	Spain	Mexico	Peru	Uruguay	Ecuador
AIDS	2.90(0.9)	2.68(1.2)	2.44(0.8)	2.91(1.1)	2.96(1.0)	2.78(1.1)	2.99(1.1)
Nuclear Med. Diagnosis	2.28(1.3)	2.16(1.4)	2.41(1.2)	2.23(1.4)	2.47(1.2)	2.34(1.2)	2.54(1.3)
x-rays	2.64(1.5)	2.04(1.2)	2.87(1.4)	2.70(1.6)	2.44(1.2)	2.40(1.3)	2.64(1.3)
Infection from animal	2.14(1.2)	2.33(1.4)	2.18(1.2)	2.18(1.4)	2.51(1.1)	2.35(1.0)	2.32(1.0)
Mammography	2.07(1.6)	1.83(1.4)	2.4(1.5)	2.08(1.0)	2.15(1.4)	2.19(1.5)	2.14(1.2)
Nuclear arms	2.63(1.7)	2.84(1.8)	2.89(1.5)	2.46(1.7)	3.37(1.3)	2.89(1.6)	2.97(1.5)
Food contaminated rad.	2.62(1.7)	2.95(1.7)	2.86(1.5)	2.71(1.7)	3.53(1.5)	2.97(1.7)	3.19(1.5)
Computerized Tomog.	2.31(1.4)	1.89(1.3)	2.45(1.2)	2.23(1.5)	2.18(1.2)	2.30(1.3)	2.46(1.4)
Road accident	3.25(1.6)	3.19(1.6)	3.49(1.4)	3.13(1.7)	3.58(1.3)	3.56(1.5)	3.70(1.2)
Nuclear power plant	2.56(1.7)	2.62(1.8)	2.81(1.5)	2.42(1.8)	3.39(1.5)	2.96(1.6)	2.92(1.6)
Magnetic resonance	2.21(1.5)	1.81(1.3)	2.36(1.2)	2.09(1.5)	2.11(1.2)	2.07(1.1)	2.22(1.1)
Surgical intervention	2.83(1.4)	2.63(1.4)	2.93(1.2)	2.79(1.5)	2.84(1.1)	2.82(1.2)	3.17(1.2)
Wrong diagnosis	2.83(1.6)	3.13(1.7)	2.85(1.3)	2.87(1.6)	3.42(1.3)	3.01(1.4)	3.28(1.2)
Nuclear wastes	2.61(1.7)	2.96(1.8)	2.95(1.5)	2.59(1.7)	3.62(1.3)	3.09(1.5)	3.11(1.4)
Terrorism	2.72(1.6)	3.06(1.8)	2.91(1.4)	2.46(1.7)	3.30(1.4)	3.01(1.5)	3.04(1.3)
Ecography	2.31(1.6)	1.76(1.3)	2.35(1.4)	1.90(1.5)	1.90(1.1)	2.03(1.5)	2.17(1.2)
Chemical wastes	2.67(1.6)	2.73(1.6)	2.80(1.3)	2.65(1.7)	3.27(1.2)	2.80(1.3)	2.95(1.4)
Floods	2.79(1.6)	2.80(1.6)	2.74(1.3)	2.70(1.6)	3.24(1.3)	3.99(1.4)	3.16(1.3)
Chemotherapy	2.75(1.5)	2.31(1.4)	2.82(1.3)	2.54(1.6)	3.12(1.3)	2.74(1.5)	3.09(1.3)
Radioactive escape	2.69(1.7)	3.18(1.8)	3.02(1.6)	2.66(1.8)	3.73(1.4)	3.15(1.7	3.17(1.6)
Natural radiation	2.59(1.4)	2.20(1.3)	2.75(1.4)	2.71(1.6)	2.56(1.2)	2.68(1.3)	2.65(1.2)
Radiotherapy	2.50(1.3)	2.38(1.3)	2.75(1.2)	2.48(1.5)	2.86(1.3)	2.72(1.4)	2.82(1.3)

Note: **: p < .001; ns: non significant differences

There were significant differences among countries in the ratings on all risks (p < .001). However, the effect size was low, as revealed by Eta coefficient. Eta coefficient values greater than 0.130 were obtained only for the following sources of risk: AIDS (.209), x-rays (.150), nuclear arms (.160) , nuclear power plant (.161), nuclear wastes (.178), terrorism (.169), ecography (.151), and radioactive escape (.175). We computed the pairwise differences on the above risks, using the Games-Howell contrast, because it no require the homoscedasticity assumption. The main differences among countries summarised are the following: In general, Peru, Ecuador, Uruguay, and Spain show higher than average means, in most of the analysed risks. On the other hand, we find that Cuba presents the lower means on all the medical applications. It could be argued that the Cuban people place special trust in the Health institutions.

The rank order of risk ratings was quite similar in all countries. The correlations between the ratings from the seven countries were in the range [.697 (Peru-Mexico) - .955 (Ecuador-Uruguay)]

Table 8. Means and standard deviations of the 22 sources of risk by countries rated on "Seriousness."

Sources of risk (Hazards)	Countries						
	Argentine	Cube	Spain	Mexico	Peru	Uruguay	Ecuador
AIDS	3.87(1.8)	3.89(1.8)	4.16(1.4)	3.67(1.8)	4.25(1.4)	4.01(1.5)	4.26(1.6)
Nuclear Med. Diagnosis	2.47(1.5)	2.39(1.6)	2.84(1.3)	2.62(1.6)	2.87(1.2)	3.00(1.4)	3.00(1.4)
x-rays	2.22(1.4)	2.22(1.5)	2.34(1.2)	2.39(1.5)	2.48(1.1)	2.57(1.3)	2.54(1.3)
Infection from animal	2.52(1.5)	3.29(1.8)	2.72(1.3)	2.57(1.7)	2.97(1.2)	2.98(1.2)	2.76(1.3)
Mammography	1.90(1.6)	2.02(1.6)	2.16(1.4)	2.03(1.6)	2.30(1.4)	2.42(1.4)	2.20(1.3)
Nuclear arms	3.31(1.8)	3.49(1.9)	3.33(1.5)	2.99(1.9)	3.70(1.4)	3.54(1.7)	3.48(1.5)
Food contaminated rad.	3.37(1.9)	3.54(1.9)	3.70(1.5)	3.20(1.9)	3.95(1.3)	3.68(1.5)	3.80(1.4)
Computerized Tomog.	2.19(1.5)	2.25(1.6)	2.42(1.2)	2.20(1.6)	2.31(1.3)	2.60(1.4)	2.50(1.2)
Road accident	3.49(1.8)	3.38(1.8)	3.76(1.5)	3.29(1.8)	3.70(1.3)	3.91(1.5)	3.83(1.4)
Nuclear power plant	3.22(1.9)	3.38(1.9)	3.46(1.5)	3.04(1.9)	3.76(1.5)	3.60(1.6)	3.51(1.6)
Magnetic resonance	2.07(1.5)	2.21(1.7)	2.20(1.2)	2.16(1.6)	2.22(1.3)	2.57(1.4)	2.45(1.3)
Surgical intervention	2.63(1.5)	2.90(1.7)	2.91(1.3)	2.76(1.6)	3.04(1.1)	3.23(1.4)	3.19(1.2)
Wrong diagnosis	3.40(1.8)	3.58(1.8)	3.68(1.5)	3.28(1.9)	3.79(1.3)	3.66(1.4)	3.77(1.3)
Nuclear wastes	3.37(1.8)	3.51(1.9)	3.62(1.5)	3.14(1.9)	3.86(1.4)	3.75(1.5)	3.72(1.5)
Terrorism	3.35(1.9)	3.51(1.9)	3.73(1.6)	3.09(1.9)	3.50(1.3)	3.63(1.5)	3.44(1.4)
Ecography	1.86(1.5)	2.09(1.7)	1.97(1.3)	1.85(1.6)	3.02(1.3)	2.10(1.4)	2.21(1.3)
Chemical wastes	3.04(1.8)	3.19(1.8)	3.27(1.4)	2.99(1.9)	3.56(1.4)	3.43(1.4)	3.35(1.3)
Floods	2.95(1.7)	3.23(1.9)	3.41(1.5)	2.99(1.8)	3.34(1.3)	3.50(1.4)	3.37(1.4)
Chemotherapy	2.99(1.7)	2.62(1.7)	3.35(1.5)	2.78(1.8)	3.29(1.4)	3.24(1.5)	3.32(1.5)
Radioactive escape	3.66(1.9)	3.72(1.9)	3.98(1.6)	3.27(1.9)	4.08(1.4)	3.90(1.6)	3.77(1.6)
Natural radiation	2.63(1.6)	2.28(1.5)	2.76(1.3)	2.71(1.7)	2.72(1.3)	3.14(1.4)	2.81(1.4)
Radiotherapy	2.68(1.6)	2.63(1.6)	3.14(1.4)	2.69(1.7)	3.08(1.4)	3.16(1.4)	3.04(1.4)

Note: **: $p < .001$; ns: nonsignificant differences

There were significant differences among the countries in all risks ($p < .001$). However, the effect size was low, as revealed by Eta coefficient. Eta coefficient values greater than 0.130 were obtained only for the following hazards: AIDS (.143), infection from animal (.137), contaminated foods (.147), road accident (.135), nuclear power plant (.134), nuclear wastes (.145), terrorism (.148), chemotherapy (.166), radioactive escape (.175), and radiotherapy (.146). We also examined the pairwise differences on the above risks, using the Games-Howell contrast, because it does not require the homoscedasticity assumption.

The main differences among countries were the following: In general, Peru, Ecuador, Uruguay and Spain show higher than average means, in most of the analysed risks, except for infection from animal, nuclear arms, and natural radiation. On the other hand, we found that Mexico presents, in general, the lowest means on all the risks rated.

The rank order of risk ratings was very similar in all countries. The correlations among the ratings from the seven countries were in the range [.913 (Cuba-Ecuador) - .985 (Uruguay-Mexico; Spain-Argentina)]

3.- The structure of risk perception.

Although some level differences have been found between countries, it could be expected that the structure of risk perception would remain the same. We carried out Principal Component Analysis and Simultaneous Component Analysis for both ratings, possibility and seriousness.

Regarding "Possibility," two components were retained (According to Kaiser's criteria, with eigenvalues > 1), accounting for 42.81% and 12.11% of the total variance, respectively. The two factors account for the 54,92% of the total variance. Table 9 shows the varimax rotated matrix.

Table 9. Factor loadings (Varimax rotated). Possibility.

	Component	
Sources of risk	1	2
Nuclear wastes	.859	.108
Radioactive escape	.856	.006
Nuclear power plants	.804	.065
Contaminated foods	.768	.143
Terrorism	.758	.195
Chemical wastes	.751	.258
Nuclear arms	.731	.167
Wrong Diagnosis	.696	.256
Floods	.655	.319
Chemotherapy	.605	.432
Radiotherapy	.526	.482
Road accident	.526	.432
AIDS	.386	.345
x-rays	.002	.778
Ecography	.043	.761
Computerized tomography	.201	.751
Mammography	.056	.733
Magnetic resonance	.232	.721
Surgical intervention	.379	.620
Nuclear medicine	.330	.592
Natural radiation	.411	.526
Infection from animal	.391	.407

The nature of the two factors is quite clear. In general, the health-related risks, voluntary and controlled by the subjects, are grouped in the second factor, whereas the non-health related, involuntary, and uncontrolled risks appear on the first factor. Chemotherapy and Radiotherapy showed the highest loadings in the first factor, possibly because they are unknown and involuntary.

In order to check whether this structure was replicated in the seven countries, we applied *Simultaneous Component Analysis* (15) to the separate correlation matrices, in order to find the best structure common to several groups. Table 10 shows the accounted for variances from SCA and from separate PCA, respectively.

Table 10. Explained Variances from SCA and Separate PCA.

Explained variances:	SCA	Separate PCA
Argentina	9.42 (42.82%)	9.44 (42.90%)
Cuba	10.79 (49.06%)	10.88 (49.46%)
Spain	9.27 (42.12%)	9.30 (42.27%)
Mexico	9.92 (45.11%)	9.94 (45.18%)
Peru	8.17 (37.12%)	8.20 (37.27%)
Uruguay	9.71 (44.12%)	9.74 (44.29%)
Ecuador	9.12 (41.46%)	9.19 (41.75%)

Total Variance Accounted for by SCA is: 66.396404 (43.11%)
Total Variance Accounted for by PCA is: 66.688417 (43.30%)

As can be seen, the differences among countries are minimal, therefore, we can state that the structure remains the same in all the nations.

The common weights matrix, obtained by varimax followed by oblique rotation, is shown in Table 11.

Table 11. Common weights after transformation

	components 1	2
var. 1	0.097	0.115
var. 2	0.031	0.283
var. 3	-0.107	0.391
var. 4	0.106	0.143
var. 5	-0.063	0.348
var. 6	0.301	-0.020
var. 7	0.304	-0.032
var. 8	-0.020	0.349
var. 9	0.173	0.108
var. 10	0.345	-0.089
var. 11	-0.009	0.349
var. 12	0.083	0.247
var. 13	0.269	0.036
var. 14	0.364	-0.052
var. 15	0.290	0.021
var. 16	-0.093	0.378
var. 17	0.277	0.038
var. 18	0.222	0.095
var. 19	0.176	0.175
var. 20	0.372	-0.084
var. 21	0.103	0.214
var. 22	0.147	0.212

It can be seen that the common structure showed by the weights is similar to the matrix of the table 9.

As far as “Seriousness” is concerned, two components were retained (According to Kaiser’s criteria, with eigenvalues > 1), account for 37.50% and 21.58 % of the total variance, respectively. The two factors account for the 59,08%. Table 12 shows the varimax rotated matrix.

Table 12. Factor loadings (Varimax rotated). Seriousness.

Sources of risk	Component	
	1	2
Nuclear wastes	.819	.248
Radioactive escape	.805	.228
Contaminated food	.790	.216
Terrorism	.779	.236
Wrong diagnostic	.765	.282
Nuclear power plant	.761	.231
Chemical wastes	.753	.294
Nuclear arms	.746	.262
Floods	.712	.309
Road accident	.696	.299
Aids	.674	.240
Chemotherapy	.602	.482
Radiotherapy	.554	.551
Infection from animal	.549	.312
Natural radiation	.547	.452
Surgical Intervention	.528	.512
Computerised tomography	.247	.757
Magnetic resonance	.290	-.721
Mammography	.162	.718
Ecography	.171	.698
x-rays	.218	.679
Nuclear medicine	.411	.589

The nature of the two factors is quite clear. In general, the health-related risks are grouped in the second factor, whereas the non-health related risks appear on the first factor. Chemotherapy and radiotherapy show a similar pattern as in the previous analysis.

In order to check whether this structure was replicated in the seven countries, we also applied

Simultaneous Component Analysis to the separate correlation matrices. Table 13 shows the accounted for variances from SCA and separate PCA

Table 13. Explained Variances from SCA and Separate PCA. Seriousness

Explained variances:	SCA	Separate PCA
Argentina	13.97 (63.51%)	13.99 (63.58%)
Cuba	12.29 (55.88%)	12.33 (56.07%)
Spain	12.29 (55.86%)	12.31 (55.96%)
Mexico	13.84 (62.91%)	13.85 (62.95%)
Peru	10.63 (48.33%)	10.66 (48.46%)
Uruguay	12.27 (55.77%)	12.29 (55.88%)
Ecuador	10.77 (48.96%)	10.82 (49.17%)

Total Variance Accounted for by SCA is: 86.069833 (55.89%)
Total Variance Accounted for by PCA is: 86.255850 (56.01%)

The common weights matrix, obtained by varimax followed by oblique rotation, is shown in Table 14.

Table 14. Common weights after transformation Seriousness

	components	
	1	2
var. 1	0.264	-0.021
var. 2	0.052	0.278
var. 3	-0.036	0.355
var. 4	0.187	0.046
var. 5	-0.081	0.397
var. 6	0.283	-0.003
var. 7	0.318	-0.036
var. 8	-0.059	0.411
var. 9	0.245	0.017
var. 10	0.302	-0.031
var. 11	-0.039	0.378
var. 12	0.121	0.202
var. 13	0.267	0.026
var. 14	0.313	-0.014
var. 15	0.287	-0.010
var. 16	-0.085	0.392
var. 17	0.264	0.040
var. 18	0.242	0.042
var. 19	0.141	0.205
var. 20	0.305	-0.020
var. 21	0.139	0.156
var. 22	0.118	0.238

It can be seen that the common structure showed by the weights is similar to the matrix of the table 7.

6) Discussion and Conclusions.

The main findings that we would like to emphasise are the following :

1.- Possibility versus Seriousness.

The “optimistic bias” identified by the “Psychometric Paradigm” is confirmed by our data: Seriousness is rated higher than possibility in most risks. There were few exceptions, most of them related to medical applications.

2.- Risk ranking.

Risk ranking is very similar in all the countries, with the known, voluntary, and beneficial risks remaining at the bottom positions. As in other studies, radiological risks related to industrial activities were at the top positions. The correlations of the risk ratings from the seven countries are quite high, both in possibility and seriousness, reaching values greater than 0.90 in seriousness.

3.- Structure of Risk Perception.

Two factors were identified from both perspectives, possibility and seriousness. This structure remains similar in all the countries, as shown by Simultaneous Component Analysis. The first factor is composed of involuntary, uncontrolled, and unknown risks, and could partially be compared to the “Dread” factor of Slovic *et al*. (2, 3, 4). However, not all included risks have “catastrophic potential,” The second factor is similar to the “knowledge of and the familiarity with the hazard” of Slovic *et al*.

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