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An educational campaign toward epilepsy among Italian primary school teachers
1. Survey on knowledge and attitudes

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ABSTRACT

A questionnaire survey was undertaken to assess the impact of a nationwide educational campaign about epilepsy on the knowledge and attitudes toward the disease among Italian primary school teachers. Five hundred and eighty-two teachers participated. All interviewees were aware of the existence of epilepsy, and most of them had direct experience with the disease. Answers about frequency, causes, outcome, and response to treatments were variable and not correlated with age, residency, and years of experience. Teachers had positive attitudes toward epilepsy, except for the idea that driving and sports can be safe for people with epilepsy. Epilepsy and its treatment were considered a source of learning disability and social disadvantages. Several teachers declared themselves being unable to help a child having seizures. Calling an ambulance was a frequent action. Knowledge and attitudes toward epilepsy are improved compared with those reported in our previous studies. Although this may be a positive reflection of the increasing knowledge and the greater availability of information on epilepsy, there are still areas of uncertainty and incorrect behaviors.

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1. Introduction

Epilepsy is a common neurological disorder still carrying important discrimination and stigma despite considerable advancements in the scientific knowledge of its causes, mechanisms, and treatments. Children with epilepsy are at particularly high risk of suffering the consequences of discrimination because social maladjustment during childhood may influence academic achievement and have profound reflections later in life. Children spend about 40% of their time at school with teachers. School teachers with correct knowledge of and appropriate attitudes toward epilepsy could put the social reflections of epilepsy in a correct perspective, thus contributing to the reduction of stigma. Public knowledge and attitudes toward epilepsy have been investigated in several countries and have been found to be mostly inadequate [1–15]. Time spent in teaching and experience with students with epilepsy predict better knowledge of the disease [7,10,16]. However, knowledge and attitudes toward epilepsy are susceptible of improvement, as shown by the positive results of educational activities [17–20]. In Italy, our group has recently investigated the knowledge and attitudes toward epilepsy in the general population [21] and among school teachers [22]. One of the results was that Italian teachers have, with some exceptions, a correct knowledge of epilepsy, its causes, outcome, and treatments. In addition, despite having some negative attitudes toward epilepsy, teachers attending disability courses and/or with more direct personal experience with children with epilepsy tend to have a more correct approach to the management of seizures and, in general, are less likely to have discriminatory attitudes compared with the general public. For this reason, we thought that prompting educational interventions for the benefit of the general public and, more specifically, of school teachers could improve the dissemination of knowledge and attitudes and ultimately improve the quality of life of children with epilepsy and their families.

When the results of the teachers' interview [22] were made available, the Italian League Against Epilepsy (LICE) decided to promote a nationwide campaign to improve public knowledge on epilepsy ("Facciamo luce sull'epilessia a scuola", i.e., "Shed light on epilepsy at school"). Against this background, we performed a new survey with a twofold aim: (i) to verify with a number of focused questions the impact of the campaign on the knowledge and attitudes of a new cohort of school teachers as compared with those of the previous teachers' cohort [22] and those of the Italian population [21] and (ii) to impart a more intensive and focused educational program to the same cohort and verify whether the program could result in further improvement to be documented with the same set of questions of the previous survey. The first aim is illustrated here. In doing this, we addressed three fundamental questions: (i) How do the teachers' knowledge of epilepsy and their attitudes toward this disease depend on their personal experience and various demographic factors? (ii) What are the knowledge and attitudes of the teachers as compared with those of the rest of the population? (iii) How did the knowledge and attitudes change as compared with the results of the previous study [22]? The second aim will be developed in a separate report.

2. Materials and methods

2.1. Nationwide educational campaign

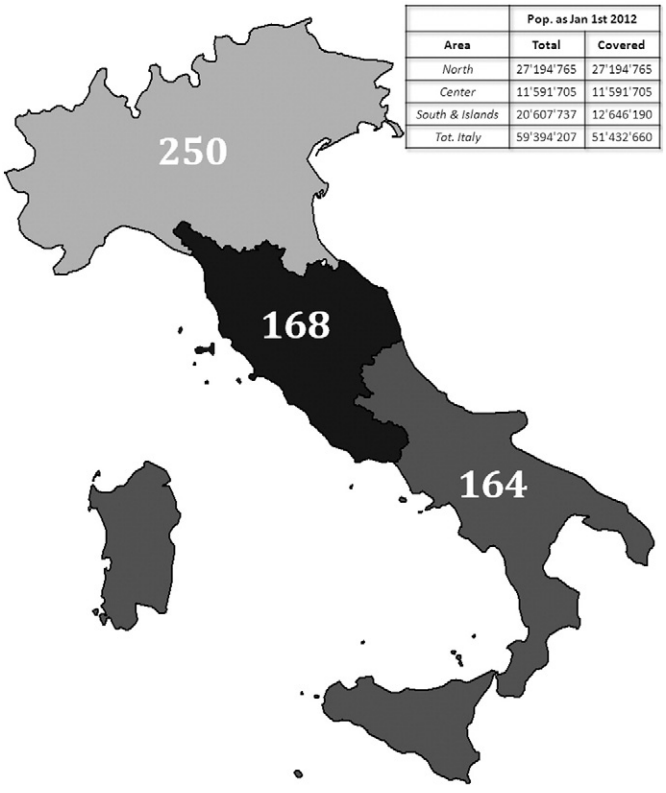
This included, among others, educational movies, delivery of pamphlets, meetings with neurologists, press releases, TV interviews, and various entertainment events performed at local, regional, and national levels. Most educational activities were performed during the first Sunday of May (elected as the Epilepsy Day in Italy) with the contribution of representatives of the Italian chapter (LICE), one from each administrative district (or group of districts). However, several initiatives were performed in other periods of time, depending on opportunities (e.g., press releases or TV interviews occasioned by stigmatizing news on epilepsy reported by local or national information sources) and upon specific requests. For further details, see www.lice.it/fondazioneepilessialice/progetti.

2.2. Study structure and population

This study was a two-stage nationwide cross-sectional survey entitled "*What do you know about epilepsy*". During the first stage, representatives of the Italian chapter (LICE), one from each administrative district (or group of districts) of the Italian territory, were asked to identify a number of primary schools located in their district. The schools were chosen at random, but, within each district, the number was correlated with the size of the local population. Within each school, only teachers representing the first and the second school year were invited to participate in the survey. This age class was selected as being the most critical for access to the child in the social environment and to match the educational material represented by a book of tales. Thirteen of the 15 districts finally participated in the study (Fig. 1). Participating teachers from each selected school were asked to fill out a 28-item questionnaire investigating three major issues: (i) general and specific knowledge about epilepsy, (ii) attitudes toward social and individual implications of epilepsy, and (iii) school-related attitudes. A number of background questions were also asked to obtain the teachers demographic, educational, and experiential profiles. The results of the first stage have been used to interpret the results of the educational process to be undertaken in the second stage of the study. The format of the questions was identical to that used in the previous survey [22], the difference being only the technique of the interview, i.e., via telephone in the former study and self-administered in the present investigation.

2.3. Statistical analysis

Descriptive statistics are reported as mean and standard deviation (SD), median and range or interquartile range (IQR), or count and percentage (%) as appropriate. Demographics (sex, age, and residency),



	Pop. as Jan 1st 2012	
Area	Total	Covered
North	27'194'765	27'194'765
Center	11'591'705	11'591'705
South & Islands	20'607'737	12'646'190
Tot. Italy	59'394'207	51'432'660

Fig. 1. Italian map including the number of teachers participating in the study.

teaching experience (number of years, experience with disabled children, and participation in disability courses), and familiarity with epilepsy (having had children with epilepsy in the classroom) were correlated with the background knowledge of the disease (paying attention to questions putting epilepsy in a correct social perspective), the management of seizures occurring in the classroom (focusing on correct and incorrect behaviors), and the impact of epilepsy on learning abilities and social activities (learning disabilities, teaching support, mental/behavioral alterations, cognitive effects of drugs, behavioral problems with peers, teacher attitude toward children with epilepsy, and restricted recreational and sport activities) using several multivariable logistic models. The results of the models are reported as adjusted odds ratios ($_{adj}$ORs). p-Values have been obtained using Pearson's chi-squared test or the Fisher exact test as appropriate. Because of the explorative nature of the study, we decided to not adjust the threshold of significance based on the amount of tests [23]; however, we considered significant p-values lower than $p = 0.005$. All tests are two-tailed with 99.5% confidence intervals (CIs). Analyses were performed with the statistical analysis software (SAS version 9.2, SAS Institute Inc., Cary, NC, USA).

3. Results

3.1. General characteristics of the sample

Five hundred and eighty-two teachers (570 women and 12 men from 150 schools) participated in the survey. The median (range) age and years of teaching were, respectively, 47 (25–64) and 20 (1–42) years. Two hundred and fifty teachers were residents of Northern Italy, 168 were residents of Central Italy, and 164 were residents of Southern Italy (Fig. 1). The main demographic characteristics of the sample are reported in Table 1. Previous or current experience with disabled children was reported by 43.6% of the interviewees, and courses on disability were attended by 60%. The geographical distribution of the teachers was no different when comparing the residency of the teachers with age ($p = 0.1866$), the experience with disabled children ($p = 0.1833$), and the attendance to disability courses ($p = 0.1471$) (data not shown). Teachers' age was also unrelated to the number of disability courses ($p = 0.7590$), but the number of teachers with experience with disabled children decreased with increasing age ($p < 0.0001$).

3.2. General and specific knowledge of epilepsy (questions 1 to 9) (Table 2)

All (582) teachers declared themselves being aware of a disease called epilepsy, 24.7% had personal or familial experience with the disease, and 34.9% had an experience mediated by friends or acquaintances. In 39.0% of the cases, the information on epilepsy was obtained through conversations with doctors, reading of scientific reports, or participation in educational courses. About one-half (47.1%) of the sample declared that they have witnessed seizures, where one-fourth of them have witnessed seizures in class. Two-thirds of the teachers could not give an estimate of epilepsy prevalence, and 109 (18.7%) gave an underestimate of the true frequency of the disease. The causes of epilepsy were, in decreasing order, hereditary diseases, perinatal insults, and traumatic brain injury. Two-thirds of the teachers reported that epilepsy can start at all ages, and only 4.5% believed that it is a mental disorder. While 91.2% of the teachers were aware that epilepsy is treatable with drugs, only 16.8% reported that it can benefit from surgical interventions, and 29.6% believed that epilepsy is curable.

Table 1
Demographics and teaching experience of the sample.

		N	%
Sex	F	570	97.9
	M	12	2.1
Residency	North	250	42.9
	Center	168	28.9
	South and islands	164	28.2
Age	25–39 years	126	21.7
	40–49 years	226	38.8
	50+ years	230	39.5
Years of teaching	1–9 years	92	15.8
	10–19 years	187	32.1
	20–29 years	165	28.4
	30+ years	138	23.7
Experience with disabled children	Yes	254	43.6
Attended courses on disabilities	Yes	349	60.0
Number of courses	0	233	40.0
	1–3	215	36.9
	4–9	86	14.8
	10+	48	8.2

3.3. Attitudes toward the social and individual implications of epilepsy (questions 10–14, 27, and 28) (Table 2)

Only 1.4% and 4.1% of the teachers considered epilepsy a limitation to marriage and procreation. Higher rates were, however, observed when teachers were asked if epilepsy is a limitation to have a regular job, to practice sports (about one-third of the responders), or to drive (one-half of the responders).

3.4. School life-related attitudes (questions 15–26) (Table 2)

Forty-eight percent of the teachers declared that they have or have had students with epilepsy, where 87.4% of them received information on the disease directly from the child's parents. About one-half of teachers declared that they are aware of what they should do if a child had seizures (65% in the subgroup of those who have/had a child with epilepsy in class). In case of seizures, 52.4% of the teachers would call an ambulance, 60% would place the child down on the floor and wait for the seizures to stop, 27.7% would place an object in the child's mouth, and 6.2% would block the child's arms during the seizures. Three-hundred and thirty-five (57.7%) teachers believed that epilepsy impairs (at least moderately) children's learning, and similar proportions reported that children with epilepsy require support at school (58.2%) or have mental and/or behavioral alterations (55.3%), antiepileptic drugs affect learning and behavior (52.1%), and children with epilepsy have behavioral problems when in the presence of other children (52.3%). The management of children with epilepsy at school should be the same for those without epilepsy for 76.2% of the interviewees. Only 12 (2.1%) teachers believed that children with epilepsy are discriminated by their classmates, while 65% believed that sports and recreational activities should overlap those of healthy children. Banned sports include, in decreasing order, scuba diving, boxing, swimming, skiing, cycling, and soccer.

3.5. Knowledge and attitudes toward epilepsy and teachers' profiles (Table 3)

To draw a comprehensive teachers' profile of the knowledge and attitudes toward epilepsy, we developed several multivariable models. These included demographics (sex, age, and residency), teaching experience (number of years, experience with disabled children, and attendance to courses on disabilities), and experience with epilepsy in the classroom. The knowledge of epilepsy was tested on two specific questions — one with a negative connotation ("Is epilepsy a mental disease?") and the other with a positive connotation ("Is it possible to recover from epilepsy?"). The attitudes toward seizures in the classroom were tested, addressing questions focusing on correct behaviors (placing the child on the floor and waiting for the seizures to stop and administration of endorectal medications), incorrect behaviors (putting something in the child's mouth and blocking arms and/or legs), and debatable behaviors (indiscriminate ambulance call). The impact of epilepsy on learning abilities and social activities was tested through

Table 2
Questions and answers.

Question	n	%
1. Do you know a disease named epilepsy?		
No	–	–
Yes	582	100
By hearsay	238	40.9
Personal or family experience	144	24.7
Friends/acquaintances	203	34.9
Medical interviews	100	17.2
Scientific pamphlets	162	27.8
Meetings, training courses	53	9.1
2. Have you ever seen a seizure?		
No	308	52.9
Yes	274	47.1
3. If yes, where?		
Classroom	144	24.8
Public place	114	19.6
Home	56	9.6
TV/movies	22	3.8
4. How many people are affected by epilepsy?		
1/10	10	1.7
1/100	88	15.1
1/1000	76	13.1
1/10,000	33	5.7
Don't know	375	64.4
5. What do you think causes epilepsy?		
Hereditary disease	317	54.5
Birth defect	229	39.3
Traumatic brain injury	213	36.6
Infection	73	12.5
Brain tumor	181	31.1
Psychological/psychiatric disease	53	9.1
Don't know	146	25.1
6. What is the age of onset of epilepsy?		
Childhood	132	22.7
Adult	–	–
All ages	391	67.2
Don't know	59	10.1
7. Do you think epilepsy is a form of psychiatric disease?		
Yes	26	4.5
No	474	81.4
Don't know	82	14.1
8. Do you think epilepsy is treatable with:		
Specific drugs	531	91.2
Surgery	98	16.8
Other	35	6.0
Don't know	44	7.6
9. Do you think epilepsy is a curable illness?		
Yes	172	29.6
No	186	32.0
Don't know	224	38.5
10. Do you think epilepsy limits marriage?		
Yes	8	1.4
No	518	89.0
Don't know	56	9.6
11. Do you think epilepsy is a limit to having children?		
Yes	24	4.1
No	455	78.2
Don't know	103	17.7
12. Do you think epilepsy limits regular employment?		
Yes	189	32.5
No	307	52.8
Don't know	86	14.8
13. Do you think epilepsy limits driving?		
Yes	300	51.6
No	125	21.5
Don't know	157	27.0
14. Do you think epilepsy limits sports and recreational activities?		
Yes	200	34.4
No	252	43.3
Don't know	130	22.3
15. Have you ever had children with epilepsy in your classroom?		
Yes	277	47.6
No	297	51.0
Don't know	8	1.4
16. Are you often informed by parents of the child's epilepsy?		
Yes	479	82.3
No	103	17.7
17. Do you know how to manage a child experiencing an epileptic attack?		
Yes	296	50.9
No	188	32.3
Don't know	98	16.8
18. In the case of a seizure in class what do you do?		
Call an ambulance	305	52.4
Have the child lie down on the ground and wait until the end of the attack	349	60.0
Place something in the child's mouth	161	27.7
Block the spasms of the limbs	36	6.2
Administer medications endorectally	192	33.0
Don't know	72	12.4
19. In your school are there difficulties in administering antiepileptic drugs during school hours?		
Yes	123	21.1
No	209	35.9
Don't know	250	43.0
20. In your opinion, to what extent does epilepsy impairs children's learning?		
Always	8	1.4
Sometimes	327	56.3
Never	124	21.3
Don't know	122	21.0
21. In your opinion, to what extent do children with epilepsy require support in school?		
Always	46	7.9
Sometimes	292	50.3
Never	139	23.9
Don't know	104	17.9
22. In your opinion, to what extent do children with epilepsy have mental and/or behavioral alterations?		
Always	11	1.9
Sometimes	311	53.4
Never	108	18.6
Don't know	152	26.1
23. In your opinion to what extent do antiepileptic drugs affect learning and behavior?		
Always	19	3.3
Sometimes	284	48.8
Never	69	11.9
Don't know	210	36.1
24. In your opinion, to what extent do children with epilepsy have relationship problems with their peers?		
Always	5	0.9
Sometimes	299	51.4
Never	195	33.5
Don't know	83	14.3
25. Compared with their classmates, how should children with epilepsy be treated with respect to attitudes and demands?		
Same	443	76.2
Differentiated	79	13.6
Don't know	59	10.2
26. Based on your experience, how do classmates behave toward a child with epilepsy?		
Normally	239	41.1
Try to help	183	31.4
Tend to marginalize	12	2.1
Don't know	148	25.4
27. In your experience, recreational and sport activities of a child with epilepsy must be:		
Normal	378	65.0
Limited	87	14.9

(continued on next page)

Table 2 (*continued*)

Question	n	%
Don't know	117	20.1
28. Which of the following sports do you think should not be recommended for a child with epilepsy?		
Soccer	38	6.5
Tennis	5	0.9
Swimming	146	25.1
Skiing	95	16.3
Athletics	11	1.9
Boxing	242	41.6
Cycling	62	10.7
Scuba diving	320	55.1
All	5	0.9
Don't know	243	41.8

direct questions pertaining to learning impairment, needed support, mental/behavioral alterations, drug-related cognitive impairment, behavioral problems with peers, teacher attitude toward children with epilepsy, and restricted recreational and sport activities. All the results are reported in Table 3.

Attending courses on disabilities was associated with a higher proportion of teachers not reporting epilepsy as a mental disease [OR (99.5% CI) = 2.13 (1.10–4.10)]. More specifically, the proportion of teachers reporting epilepsy as a mental disorder was 26.1% for those who did not attend any course on disability and 13.5% for those who attended at least one course. Teaching in Northern rather than in Southern Italy was associated with a lower probability not to call an ambulance [OR (99.5% CI) = 0.47 (0.26–0.86)]. Female teachers had a higher propensity not to block children arms/legs during seizures [OR (99.5% CI) = 10.7 (1.6–73.2)], and those who had children with epilepsy in the classroom were more inclined to administer medications endorectally during seizures [OR = 5.3 (3.0–9.5)] and less inclined to believe that children with epilepsy have learning impairment [OR = 0.50 (0.26–0.93)] and have mental/behavioral alterations [OR = 0.50 (0.26–0.98)].

3.6. General knowledge and attitudes of the present sample compared with the Italian population and the teachers participating in the previous surveys (Table 4)

Compared with the Italian population, the school teachers in the present survey have a higher overall awareness of epilepsy (100% vs. 93.4%), more personal exposure to the disease (24.7% vs. 11.9%), and more information obtained from medical interviews/scientific pamphlets or training courses (39.0% vs. 5.3%). Teachers also have a greater awareness of the efficacy of drugs and surgery (respectively 91.2% vs. 86.2% and 16.8% vs. 10.7% in the general population) and more clear ideas on how to manage seizures (50.9% vs. 36.9%). Furthermore, less teachers recognize epilepsy as the result of an infection (12.5% vs. 25.5%) or a mental disease (4.5% vs. 36.5%) and consider the disease as a limitation to marriage (1.4% vs. 19.6%), procreation (4.1% vs. 17.8%), occupation (32.5% vs. 57.0%), driving (51.6% vs. 79.4%), and engagement in leisure or sport activities (34.4% vs. 57.6%). However, teachers were also less aware of the real prevalence of the disease (15.1% vs. 29.2%), that epilepsy may be due to a birth defect (39.3% vs. 55.8%) or a traumatic brain injury (36.6% vs. 62.4%), and that epilepsy is a curable disease (29.6% vs. 53.9%).

Compared with primary and secondary school teachers who participated in our previous survey, the present teachers showed higher awareness that surgery is a therapeutic option (16.2% vs. 10.5%) and lower awareness that epilepsy is caused by an infection (12.5% vs. 20.2%) or is a mental disease (4.5% vs. 36.5%) and a limitation to marriage (1.4% vs. 19.6%), procreation (4.1% vs. 17.8%), and driving (51.6% vs. 79.4%) (Table 4). However, primary and secondary school teachers from the previous survey were more aware of the actual frequency of epilepsy (29.1% vs. 15.1%), that epilepsy is a curable disease (40.6% vs. 29.6%), and that epilepsy is possibly caused by a birth defect (54.2% vs. 39.3%). They also claimed that they have a higher level of information on the disease (55.7% vs. 39.0%).

3.7. School-related attitudes of the present sample compared with the teachers participating in the previous survey (Table 5)

As compared with their colleagues involved in the previous interview, the present teachers reported less difficulties in administering antiepileptic drugs at school (21.1% vs. 51.0%) (Table 5). In the presence of seizures, less teachers from the present survey would call an ambulance, place something in the child's mouth, and block the movements of the child's arms or legs during seizures, while 33.0% of them vs. 7.7% of former school teachers would administer medications endorectally. In the present sample's opinion, epilepsy impairs children's learning and requires support at school to a lesser extent than thought by their colleagues from the previous interview.

4. Discussion

This survey shows that Italian teachers working in the primary school are fully aware of the existence of epilepsy, most of them having direct experience with the disease. However, the knowledge of epilepsy in terms of frequency, causes, outcome, and response to the available treatments is still limited and does not seem to be affected by age, geographical distribution, duration of occupation, and direct experience with the disease. With few exceptions, teachers have positive attitudes toward epilepsy, concerns being present only on the ability to drive and the practice of sports. In contrast, teachers consider epilepsy (and its treatment) a source of learning disability and perhaps a social disadvantage which needs to be managed with ad hoc support activities. This may depend on having contacts with the most severe cases, as parents may not disclose the disease of children with benign epilepsy syndromes. Unfortunately, still several teachers were unable to provide correct approaches to seizures which may occur in class, and calling an ambulance is a prevailing action.

When compared with the general population, the surveyed teachers were more cognizant of the frequency and characteristics of epilepsy and had better attitudes in general and in the specific management of seizures. However, if this may be the consequence of a better cultural background and the higher probability of having direct experience with the disease, the same is not true when comparing the present sample with Italian school teachers who participated in the previous survey [22] who were supposed to share with them background and experience. The present sample compared favorably with the former in terms of knowledge, general attitudes and actions taken in the presence of seizures. There are two possible explanations for the better results of this survey. One is that we may overestimate our findings as in the other survey [22] there were both elementary and secondary school teachers, and the latter have been observed to perform worse in terms of knowledge (accurate estimate of the age at onset of epilepsy) and stigma (belief that epilepsy is a source of mental disturbances). Our findings have been confirmed by others [11]. The second is the impact of the numerous initiatives enacted in the last few years by LICE, the Italian chapter, to improve the knowledge of the disease, abate the negative attitudes, and ultimately reduce stigma.

Personal experience was also found to encourage teachers to correctly assist a child having seizures and administer endorectal medications. Other reports found that teachers with personal experience with epilepsy gave more correct answers to questions regarding knowledge and attitudes toward epilepsy [7,8,10,16].

Unfortunately, still about 12% of the teachers declared that they are unable to manage a child having seizures, and more than 50% reported that they would call the emergency services when witnessing seizures in class. The inability of school teachers to help a child having seizures has been documented by several others [1–6,8,12,13,24]. The attitude

Table 3
Knowledge and attitudes toward epilepsy and teachers' profiles. Multivariable models.

Outcomes	Independent predictors								
	Demographics predictors					Teaching experience predictors			
	Sex	Age	Residency			Years of teaching	Support	Courses on disability	Epilepsy child
	F vs. M	x + 1 vs. x	N vs. S	C vs. S	N vs. C	x + 1 vs. x	Y vs. No	Y vs. No	Y vs. No
	$_{adj}$OR (99.5% CI)	$_{adj}$OR (99.5% CI)	$_{adj}$OR (99.5% CI)	$_{adj}$OR (99.5% CI)	$_{adj}$OR (99.5% CI)	$_{adj}$OR (99.5% CI)	$_{adj}$OR (99.5% CI)	$_{adj}$OR (99.5% CI)	$_{adj}$OR (99.5% CI)
Knowledge of epilepsy									
Epilepsy is NOT a mental disease	0.95 (0.10–9.00)	1.00 (0.94–1.06)	0.94 (0.44–2.01)	0.85 (0.38–1.92)	1.10 (0.52–2.32)	1.01 (0.96–1.06)	1.08 (0.54–2.15)	**2.13** (**1.10–4.10**)	1.66 (0.87–3.17)
Epilepsy is curable	2.15 (0.24–19.54)	1.01 (0.95–1.06)	1.05 (0.56–1.99)	1.04 (0.52–2.09)	1.01 (0.53–1.90)	1.00 (0.96–1.05)	1.41 (0.80–2.51)	0.73 (0.42–1.29)	1.05 (0.62–1.79)
Attitudes toward seizures									
Place child on the floor	1.13 (0.21–6.08)	1.01 (0.96–1.06)	1.10 (0.61–2.00)	0.97 (0.51–1.85)	1.13 (0.63–2.04)	1.01 (0.97–1.05)	1.30 (0.76–2.22)	1.15 (0.68–1.95)	1.31 (0.80–2.15)
Administer drugs endorectally	0.48 (0.08–2.87)	0.96 (0.90–1.02)	1.53 (0.77–3.06)	1.74 (0.82–3.70)	0.88 (0.46–1.70)	1.02 (0.97–1.07)	1.51 (0.83–2.75)	0.70 (0.38–1.30)	**5.29** (**2.95–9.47**)
Do NOT put anything in the child's mouth	2.28 (0.42–12.43)	0.99 (0.94–1.05)	1.26 (0.66–2.44)	0.97 (0.48–1.94)	1.30 (0.68–2.50)	0.98 (0.94–1.03)	0.85 (0.48–1.53)	0.66 (0.37–1.19)	1.38 (0.80–2.39)
Do NOT block arms or legs	**10.72** (**1.57–73.20**)	1.08 (0.96–1.21)	2.27 (0.73–7.10)	2.79 (0.71–11.02)	0.81 (0.21–3.23)	0.95 (0.86–1.05)	1.24 (0.41–3.80)	0.89 (0.30–2.67)	0.79 (0.28–2.22)
Do NOT call ambulance	1.63 (0.27–9.84)	1.04 (0.94–1.03)	**0.47** (**0.26–0.86**)	0.69 (0.37–1.32)	0.68 (0.38–1.23)	0.98 (0.94–1.03)	1.35 (0.79–2.32)	0.59 (0.35–1.01)	0.91 (0.56–1.50)
Impact of epilepsy on social activities									
Epilepsy DOES NOT impair the child's learning	1.42 (0.14–14.08)	1.01 (0.94–1.07)	1.07 (0.50–2.29)	0.97 (0.43–2.17)	1.10 (0.52–2.31)	0.97 (0.92–1.02)	0.94 (0.49–1.84)	0.83 (0.43–1.61)	**0.50** (**0.26–0.93**)
Child DOES NOT need support	0.96 (0.14–6.73)	1.01 (0.95–1.07)	0.91 (0.45–1.85)	0.72 (0.33–1.55)	1.26 (0.62–2.59)	1.00 (0.95–1.05)	0.97 (0.51–1.85)	1.00 (0.53–1.89)	0.56 (0.31–1.01)
Child DOES NOT have mental/behavioral alterations	1.05 (0.10–10.82)	0.97 (0.90–1.03)	0.68 (0.32–1.45)	0.45 (0.19–1.08)	1.50 (0.65–3.48)	1.00 (0.95–1.06)	1.15 (0.56–2.35)	0.93 (0.46–1.90)	**0.50** (**0.26–0.98**)
Child DOES NOT have drug-related cognitive impairment	NE	1.03 (0.95–1.11)	0.50 (0.19–1.28)	0.73 (0.29–1.84)	0.72 (0.27–1.94)	0.97 (0.91–1.04)	1.08 (0.46–2.50)	0.96 (0.42–2.24)	0.70 (0.32–1.53)
Child DOES NOT have problems with peers	3.03 (0.33–27.52)	0.97 (0.92–1.02)	0.82 (0.43–1.56)	0.75 (0.37–1.50)	1.09 (0.57–2.08)	1.03 (0.98–1.07)	1.21 (0.68–2.16)	0.97 (0.54–1.73)	0.99 (0.58–1.69)
Teachers should have the same attitude toward child	0.39 (0.06–2.44)	0.97 (0.91–1.05)	1.22 (0.51–2.94)	0.93 (0.34–2.48)	1.32 (0.55–3.15)	1.00 (0.94–1.06)	0.54 (0.24–1.20)	0.96 (0.44–2.08)	1.98 (0.94–4.18)
Child SHOULD NOT have restriction on sport activities	0.47 (0.08–2.84)	0.97 (0.90–1.04)	1.23 (0.52–2.86)	1.08 (0.42–2.77)	1.13 (0.50–2.57)	1.02 (0.96–1.08)	1.37 (0.65–2.88)	1.27 (0.58–2.76)	1.15 (0.57–2.32)

F = Females, M = Males; N = North; S = South; C = Center; Y = Yes; $_{adj}$OR = adjusted odds ratios; 99.5% CI = 99.5% confidence intervals; NA = not applicable. Significant Adjusted ORs are reported in bold.

Table 4
Knowledge and general attitudes toward epilepsy in the general population (GP), primary (P) and secondary (S) school teachers, and the teachers in the present sample.

	Present sample N = 582	GP N = 1556	P and S teachers N = 600
Do you know the disease called "epilepsy"?			
Yes	582 (100)	1453 (93.4)***	598 (99.7)
Do you know epilepsy?			
By hearsay	238 (40.9)	823 (56.6)***	241 (40.3)
Personal or familial experience	144 (24.7)	173 (11.9)***	202 (33.8)
Friends/acquaintances	203 (34.9)	380 (26.2)***	184 (30.8)
Doctor/scientific information	227 (39.0)	77 (5.3)***	335 (55.7)***
Have you ever seen a seizure?			
Yes, personally	274 (47.1)	656 (45.1)	331 (55.3)*
What is the approximate prevalence of epilepsy in Italy?			
1/100 (correct response)	88 (15.1)	425 (29.2)***	174 (29.1)***
What do you think cause epilepsy?			
Hereditary disease	317 (54.5)	742 (51.1)	329 (55.0)
Birth defect	229 (39.3)	811 (55.8)***	324 (54.2)***
Viral infection	73 (12.5)	371 (25.5)***	121 (20.2)**
Head injury	213 (36.6)	906 (62.4)***	220 (36.8)
Brain tumor	181 (31.1)	476 (32.8)	175 (29.3)
Psychological/psychiatric disease	53 (9.1)	815 (56.1)***	118 (19.7)***
What is the age of onset of epilepsy?			
Childhood	132 (22.7)	252 (17.3)	221 (37.0)***
All ages	391 (67.2)	1045 (71.9)	367 (61.3)
Don't know	59 (10.1)	156 (10.7)	10 (1.7)***
Do you think epilepsy is a form of psychiatric disease?			
Yes	26 (4.5)	531 (36.5)***	65 (10.9)**
Do you think epilepsy is treatable with:			
Specific drugs	531 (91.2)	1252 (86.2)*	553 (92.5)
Surgery	98 (16.8)	156 (10.7)**	63 (10.5)**
Do you think epilepsy is a curable illness?			
Yes	172 (29.6)	783 (53.9)***	243 (40.6)***
Don't know	224 (38.5)	154 (10.6)***	75 (12.5)***
To what extent does epilepsy limit marriage?			
Strongly/moderately	8 (1.4)	285 (19.6)***	197 (33.0)***
To what extent does epilepsy limit having children?			
Strongly/moderately	24 (4.1)	259 (17.8)***	147 (24.6)***
To what extent does epilepsy limit regular employment?			
Strongly/moderately	189 (32.5)	829 (57.0)***	237 (39.7)
To what extent does epilepsy limit driving?			
Strongly/moderately	300 (51.6)	1154 (79.4)***	438 (73.2)***
To what extent does epilepsy limit sports and leisure activities?			
Strongly/moderately	200 (34.4)	837 (57.6)***	196 (32.8)
Do you know how to manage a person experiencing an epileptic attack?			
Yes	296 (50.9)	536 (36.9)***	201 (33.6)***

Asterisks indicate significant comparisons between the present sample and each of the other two samples separately.
* $p < 0.005$.
** $p < 0.001$.
*** $p < 0.0001$.

Table 5
School-related attitudes toward epilepsy in primary (P) and secondary (S) school teachers and the teachers in the present sample.

	P and S teachers N = 600	E teachers N = 582
Have you ever had children with epilepsy in your classroom?		
Yes	263 (44.0)	277 (47.6)
In the case of a seizure in class (with loss of consciousness, drop, and spasms of the whole body) what would you do?		
Call an ambulance	409 (68.4)	305 (52.4)***
Have the person lie down on the ground and wait until the end of the attack	322 (53.8)	349 (60.0)
Place something in the child's mouth	346 (57.9)	161 (27.7)***
Block the spasms of the limbs	73 (12.2)	36 (6.2)**
Administer medications endorectally	46 (7.7)	192 (33.0)***
In your school are there difficulties in administering antiepileptic drugs during school hours?		
Yes	305 (51.0)	123 (21.1)***
Don't know	104 (17.4)	250 (43.0)***
In your opinion, to what extent does epilepsy impair children's learning?		
Not at all	218 (36.5)	124 (21.3)***
In your opinion, to what extent do children with epilepsy require support in school?		
Not at all	200 (33.4)	139 (23.9)**
To what extent do children with epilepsy have mental and/or behavioral alterations?		
Not at all	144 (24.1)	108 (18.6)
In your opinion, to what extent do antiepileptic drugs affect learning and behavior?		
Not at all	58 (9.7)	69 (11.9)
In your opinion, to what extent do children with epilepsy have relationship problems with other children?		
Not at all	185 (30.9)	199 (33.5)
Compared with their healthy classmates, how should children with epilepsy be treated with respect to attitudes and demands?		
The same	468 (78.3)	443 (76.2)
Based on your experience, how do classmates behave toward a child with epilepsy? (not considering Don't know)		
Tend to marginalize	29 (5.4)	12 (2.8)
In your experience, recreational and sports activity of the child with epilepsy must be:		
Limited	82 (13.7)*	87 (14.9)

* $p < 0.005$.
** $p < 0.001$.
*** $p < 0.0001$.

to call the emergency services may reflect the policy of several schools (in Italy and other countries), which require calling an ambulance for every prolonged convulsive seizure that occurs at school, potentially causing treatment delays and subsequent complications for the child [25,26]. Current guidelines in several European countries (including Italy) recommend immediate treatment of children with such seizures to prevent progression to status epilepticus and neurological morbidity [27]. As children are unconscious during prolonged convulsive seizures, the administration of rescue medication depends on the presence of a teacher or other members of staff trained and able to administer such treatment. However, the situation is highly variable across schools and depends mainly on the goodwill and the local resources [28]. In addition, several teachers may have concerns about the legal implications of the administration of rescue medication.

In light of the study results, we are fairly confident that knowledge and attitudes toward epilepsy by Italian teachers working in the primary school are satisfactory. However, still 9.1% of the interviewees thought that epilepsy is a mental disease, and 12.5% thought that it is infectious. These observations provide the background for educational campaigns on epilepsy. Specific educational interventions have been imparted to the teachers participating in this survey. We will verify whether this effort translates in further improvement in the knowledge and attitudes of a professional category having a substantial influence on the growing generations.

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References

[1] Lee H, Lee SK, Chung CK, Yun SN, Choi-Kwon S. Familiarity with, knowledge of, and attitudes toward epilepsy among teachers in Korean elementary schools. Epilepsy Behav 2010;17(2):183–7.

[2] Thacker AK, Verma AM, Ji R, Thacker P, Mishra P. Knowledge awareness and attitude about epilepsy among schoolteachers in India. Seizure 2008;17(8):684–90.

[3] Bishop M, Boag EM. Teachers' knowledge about epilepsy and attitudes toward students with epilepsy: results of a national survey. Epilepsy Behav 2006;8(2):397–405.

[4] Shehata GA, Mahran DG. Knowledge, attitude and practice with respect to epilepsy among school teachers in Assiut city, Egypt. Epilepsy Res 2010;92(2–3):191–200.

[5] Alkhamra H, Tannous A, Hadidi M, Alkhateeb J. Knowledge and attitudes toward epilepsy among school teachers and counselors in Jordan. Epilepsy Behav 2012;24(4):430–4.

[6] Babikar HE, Abbas IM. Knowledge, practice and attitude toward epilepsy among primary and secondary school teachers in south Gezira locality, Gezira state, Sudan. J Fam Comm Med 2011;18(1):17–21.

[7] Wodrich DL, Jarrar R, Buchhalter J, Levy R, Gay C. Knowledge about epilepsy and confidence in instructing students with epilepsy: teachers' responses to a new scale. Epilepsy Behav 2011;20(2):360–5.

[8] Brabcova D, Lovasova V, Kohout J, Zarubova J. Familiarity with and attitudes towards epilepsy among teachers at Czech elementary schools — the effect of personal experience and subspecialization. Seizure 2012;21:461–5.

[9] Gzirishvili N, Kasradze S, Lomidze G, Okujava N, Toidze O, de Boer HM, et al. Knowledge, attitudes, and stigma towards epilepsy in different walks of life: a study in Georgia. Epilepsy Behav 2013;27(2):315–8.

[10] Lee SA, Yim SB, Rho YI, Chu M, Park HM, Lee GH, et al. Factors contributing to Korean teachers' attitudes toward students with epilepsy. Epilepsy Behav 2011;20(2):378–81.

[11] Lim KS, Hills MD, Choo WY, Wong MH, Wu C, Tan CT. Attitudes toward epilepsy among the primary and secondary school teachers in Malaysia, using the public attitudes toward epilepsy (PATE) scale. Epilepsy Res 2013;106(3):433–9.

[12] Mustapha AF, Odu OO, Akande O. Knowledge, attitudes and perceptions of epilepsy among secondary school teachers in Osogbo South-West Nigeria: a community based study. Niger J Clin Pract 2013;16(1):12–8.

[13] Toli T, Sourtzi P, Tsoumakas K, Kalokerinou-Anagnostopoulou A. Association between knowledge and attitudes of educators towards epilepsy and the risk of accidents in Greek schools. Epilepsy Behav 2013;27(1):200–3.

[14] Yang RR, Wang WZ, Snape D, Chen G, Zhang L, Wu JZ, et al. Stigma of people with epilepsy in China: views of health professionals, teachers, employers, and community leaders. Epilepsy Behav 2011;21(3):261–6.

[15] Zanni KP, Matsukura TS, Maia Filho Hde S. Beliefs and attitudes about childhood epilepsy among school teachers in two cities of southeast Brazil. Epilepsy Res Treat 2012;2012:819859.

[16] Bishop M, Slevin B. Teachers' attitudes toward students with epilepsy: results of a survey of elementary and middle school teachers. Epilepsy Behav 2004;5(3):308–15.

[17] Fernandes PT, Noronha AL, Araújo U, Cabral P, Pataro R, de Boer HM, et al. Teachers perception about epilepsy. Arq Neuropsiquiatr 2007;65(Suppl. 1):28–34.

[18] Kim MK, Kim IK, Kim BC, Cho KH, Kim SJ, Moon JD. Positive trends of public attitudes toward epilepsy after public education campaign among rural Korean residents. J Korean Med Sci 2003;18(2):248–54.

[19] Mirnics Z, Czikora G, Závecz T, Halász P. Changes in public attitudes toward epilepsy in Hungary: results of surveys conducted in 1994 and 2000. Epilepsia 2001;42(1):86–93.

[20] Caveness WF, Gallup Jr GH. A survey of public attitudes toward epilepsy in 1979 with an indication of trends over the past thirty years. Epilepsia 1980;21:509–18.

[21] Mecarelli O, Capovilla G, Romeo A, Rubboli G, Tinuper P, Beghi E. Past and present public knowledge and attitudes towards epilepsy in Italy. Epilepsy Behav 2010;18:110–5.

[22] Mecarelli O, Capovilla G, Romeo A, Rubboli G, Tinuper P, Beghi E. Knowledge and attitudes toward epilepsy among primary and secondary schoolteachers in Italy. Epilepsy Behav 2011;22:285–92.

[23] Bender R, Lange S. Adjusting for multiple testing—when and how? J Clin Epidemiol 2001;54:343–9.

[24] Kaleyias J, Tzoufi M, Kotsalis C, Papavasiliou A, Diamantopoulos N. Knowledge and attitude of the Greek educational community toward epilepsy and the epileptic student. Epilepsy Behav 2005;6:179–86.

[25] Chin RF, Verhulst L, Neville BG, Peters MJ, Scott RC. Inappropriate emergency management of status epilepticus in children contributes to need for intensive care. J Neurol Neurosurg Psychiatry 2004;75:1584–8.

[26] Tirupathi S, McMenamin JB, Webb DW. Analysis of factors influencing admission to intensive care following convulsive status epilepticus in children. Seizure 2009;18:630–3.

[27] Wait S, Lagae L, Arzimanoglou A, Beghi E, Bennett C, Cross JH, et al. The administration of rescue medication to children with prolonged acute convulsive seizures in the community: what happens in practice? Eur J Paediatr Neurol 2013;17:14–23.

[28] Cross JH, Wait S, Arzimanoglou A, Beghi E, Bennett C, Lagae L, et al. Are we failing to provide adequate rescue medication to children at risk of prolonged convulsive seizures in schools? Arch Dis Child 2013;98:777–80.