ORIGINAL PAPER

Evaluating a Health Educational First Aid Program for Special Education School Personnel: a Cluster Randomised Trial

Marianthi Alexandropoulou RN, PhD
Metaxa Oncology Hospital of Piraeus, Piraeus, Greece

Corespondence: Marianthi Alexandropoulou, Metaxa Oncology Hospital of Piraeus, Greece.
Email address: malexan@nurs.uoa.gr

Abstract

Aim: To evaluate the effectiveness of a health educational first aid program for special education school personnel.
Design: Cluster randomized trial using Solomon four group design.
Setting: Twenty-four randomly selected special education schools in Attiki, Greece. For conducting the study ethical approval was granted both by the Greek Ministry of Education and the Pedagogic Institution.
Method: Schools were randomized in four groups. The two intervention groups consisted of 86 participants and the two control of 94.
Results: Knowledge was assessed by a First Aid Questionnaire (Cronbach's alpha=0.79) employing non parametric tests. Statistical analysis showed significant difference within the four groups. Intervention groups had improved significantly their knowledge showing that the program was effective (Kruskal-Wallis one way ANOVA χ^2=74.383, p<.001) and that they would eventually deal with a threatening situation with right handlings (Kruskal-Wallis one way ANOVA χ^2=74.173, p<.001) Insecurity and doubting in relation to providing first aid were reduced (Kruskal-Wallis one way ANOVA χ^2=42.604, p<.001). Intervention groups understood the educational program and acquired a sufficient level of knowledge (Kruskal-Wallis one way ANOVA χ^2=55.256 p<.001).
Conclusion: First aid health educational program on the one hand enhanced knowledge and improved skills, but on the other hand training is imperative in regular intervals carried out by trained healthcare professionals.

Key words: effectiveness, first aid, health education, knowledge, special education school personnel.

Introduction

Health education programs applied in schools are able to prevent health related problems thus contributing to youngsters' and community's wellness (Alexandropoulou, 2011; Inman et al 2011). First aid health education programs in schools are substantial. Performing first aid actions requires a person's active and responsible participation based on the ability of taking the right decisions. Health education in first aid supports such an ability providing knowledge and skills enhancing people's ability to take correct actions. The immediate response in a health emergency can limit undesirable outcomes or even save lives. Schools of special education facilitate children with special healthcare needs and disabilities where school personnel must deal with more frequent and complex health emergencies than those in regular schools (Barrett, 2001).

In literature the need for first aid health education programs addressed to the public is well documented (Eisenburger & Safar, 1999; Stign et al, 2009). Nonetheless, authors argue not only about first aid knowledge but also about people's intention to take correct actions in case of a health emergency (Eisenburger & Safar, 1999; Larsson et al, 2002; Stign et al, 2009) which is very crucial in the case of school personnel dealing with children prone to health incidents. In the present study the application of knowledge indicators (correct knowledge, perceived knowledge and accuracy of knowledge) as proposed by Dugdale et al (1979) on the one hand explores school personnel's insecurity and doubting to provide first aid and on the other hand investigates whether school personnel

would eventually deal with a threatening situation by taking correct actions.

Definitions of terms

Since the present paper refers to an evaluation of a health educational program it is necessary to provide definitions of first aid, health promotion and health education, evaluation, and knowledge indicators.

First aid

First aid is the immediate care given to an injured person or to someone who suddenly got sick (Baltopoulos, 2001). First aid do not substitute for medical care, they just are a temporary support until specialized care could be provided.

Health Promotion and Health Education

Literature reveals many definitions and discrimination between the terms of Health Education and Health Promotion (World Health Organization, 1986; Downie et al, 1992; Ewles & Simnett, 1995; Maben & Macleod Clark, 1995; Green & Kreuter, 1999; Whitehead, 2004; Tones & Green 2005). According to WHO (1986) Health Promotion is a process that gives the people the opportunity to control and improve their health. If it is considered as an "umbrella term" then it includes the concepts of Health Education, Prevention, Health Protection and Environmental Control (Tones & Green 2005) and it aims at reducing health inequalities, ensuring same opportunities, and protecting people and their environment (Sourtzi, 1998).

For the purpose of the present paper the most appropriate definition of Health Education is that of Draijer & Williams (1991). According to that Health Education is an educational process based on scientific principles and uses programmed learning opportunities that enable people, when acting as individuals or as a whole to decide and to act consciously on matters affecting their health. It aims at improving awareness, informing on health maters, modifying beliefs, attitudes and behaviors, and changing environment (Sourtzi, 1998).

Evaluation

According to Downie et al (1992) two views slightly different pervade literature on the matter of health promotion evaluation. From the first viewpoint evaluation involves assessing an activity in terms of the aims or specific objectives of that activity. From the second viewpoint it involves assessing an activity by measuring it against a standard which is not necessarily related to the specific objectives or purpose of the activity. The second viewpoint is supported by Green & Kreuter (1999) who define evaluation as the comparison of an object of interest against a standard of acceptability. Tones και Green (2005) use the European Commission Department of Health and Consumer Protection's glossary of public health technical terms to define evaluation as the "*critical and objective assessment of the degree to which services or interventions fulfill stated goals. The achievement must be compared with predetermined standards of expectations*".

Health promotion program evaluation is substantial according to Tones και Green (2005) as it contributes to knowledge base/theory of health promotion, provides insights that will result in more effective health promotion practice, assesses relative costs and benefits in financial terms, assesses levels of stakeholder satisfaction, gives evidence to influence policymakers in respect of health policy development and continued employment of researchers and health promotion departments, and last but not least assesses impact on individual and public health.

Knowledge indicators

Knowledge is usually evaluated with dichotomous questions (i.e. yes-no or right-wrong). According to Dugdale et al (1979) adding a third possible answer (I do not know) enables the creation of indicators that can provide more information. Such indicators are Correct Knowledge (number of correct responses / total number of questions), Perceived Knowledge (number of questions marked yes or no / total number of questions), and Accuracy of Knowledge (number of correct responses / number of responses marked yes or no).

If the choice of "I do not know" is not provided respondents are obliged to answer the dichotomous pattern resulting in lack of accuracy in conclusions. The aim is a high level of correct knowledge. If the respondents mark the "I do not know" answer it means that either they really are unaware or they doubt. The Perceived Knowledge Indicator shows the level of knowledge that the respondents assume they have. In case the indicator is low the respondents either did not understand the information given or they have great uncertainty about what they

learned. The Accuracy of Knowledge Indicator shows whether respondents' knowledge is correct. A low level of the indicator shows that the respondents were exposed to fallacious material or the material was uncritically accepted. To choose the correct or wrong answer while there is the alternative choice of "I do not know" shows that this really is the level of knowledge on the matter.

Literature Review

A literature review preceded the study and focused on the effectiveness of interventions for improving first aid school personnel knowledge. The bibliographical databases CINALH and Pubmed were searched for the years 1990 and onward. A secondary search was conducted by investigating the reference lists of the gathered literature. Key words used were effectiveness, first aid, health education, knowledge, and school personnel. The review did not yield ample data. Two surveys (Bahari et al, 2003; Baser et al, 2007) and one quasi experimental study (Barrett, 2001) were retrieved concerning school personnel knowledge in first aid and none of them used knowledge indicators (Dugdale et al, 1979).

Barrett (2001) evaluated the effectiveness of a health educational intervention for 324 teachers. She explored their knowledge and anxiety about managing children experiencing health emergencies using a quasi experimental design with two non equivalent groups. The intervention group (214 teachers) received the teaching intervention and the control group (110 teachers) was offered the teaching intervention at a later date. The initial sample consisted of 395 teachers achieving a response rate of 82%. The intervention resulted in increased knowledge and decreased anxiety about emergency response.

Bahari et al (2003) explored the level of knowledge about asthma in primary school children. Although teachers presented satisfactory knowledge about asthma they did not know how to deal with it. Accordingly, Baser et al (2007) in their survey found that only 25% of the school teachers had a satisfactory knowledge in first aid and half of them in a sample of 312 teachers had never been trained in health emergencies.

It must be noted that the formulation of the present paper's research hypotheses was based in two more studies, although they do not refer to school personnel in particular but to students. Both studies (Veskouki, 2002; Trifoni et al, 2005) used quasi experimental designs without control groups investigating the effectiveness of a first aid health education program for students. Both programs were effective but the researchers also observed that female students performed better than male students. That was a finding which was worth exploring in the present study.

Ethical Considerations

For conducting the study ethical approval was asked and granted from the Department of Special Education of the Greek Ministry of Education and from the Pedagogic Institution for the school year 2007-2008. It is important to note that the study – although a randomised trial – was not registered because at the time of planning and implementation there was not a registry for non pharmacological/non clinical randomised trials. Informed consent was also asked and granted from each school principle and from each participant by an information letter. Participation in the study was voluntary and the data collected were anonymous and confidential. Each school and participant was given a code number to correspond with the questionnaires collected so as for anonymity and confidentiality to be preserved. Participants were informed about their right to withdraw from the study at their disposal. The time and place of the training program were defined by the school principle for not disturbing the school program. The duration of the educational program was four hours in each school (two meetings of two hours long). The health education program was conducted in all schools by the researcher.

Health education techniques used were passive methods (lecture), proactive methods (discussion) and experience (demonstration, performing techniques). All participants were given information material but in different time periods because of the study design. Control groups were given the material on the completion of the study. The study had no possible dangers. Possible benefit for the special education school personnel was knowledge and skill improvement in first aid.

Aim and Hypotheses

An experimental study was chosen as most appropriate to give evidence on cause (health education program) and effect (first aid knowledge) (Burns & Grove, 2009).

The aim of the study was to examine the effectiveness of a health educational first aid program for special education school personnel. The objectives of the study were:

(a) to evaluate personnel's knowledge prior and after the educational program,

(b) to evaluate knowledge by using knowledge indicators as proposed by Dugdale (1979),

(c) to explore if improvement in knowledge is due to the health education program, and

(d) to examine whether independent variables influence the level of knowledge (i.e. gender, previous experience etc).

Based on the literature review the study's hypotheses were that:

(a) the school personnel's knowledge improves after the completion of the educational program,
(b) knowledge indicators improve after the completion of the educational program, and

(c) women perform better than men.

Method

Study Design

The study took place from January 2008 (1st observation) until May 2008 (2nd observation) and it used the Solomon four group experimental design (Burns & Grove, 2009), which is represented in table 1.

Table 1: Solomon four group design

1st observation			2nd observation
Group 1	R_1 O_1	X	O_3
Group 2	R_2	X	O_4
Group 3	R_3 O_2		O_5
Group 4	R_4		O_6

R= randomized groups
O= observation (knowledge evaluation),
X= intervention (health education program).

Sample

Study sample consisted of twenty-four schools of special education in Attiki, Greece. Cluster random sampling and cluster randomization by lottery were used (Burns & Grove, 2009). Twenty-eight schools were randomly chosen by a list of all schools of special education in the region of Attiki, Greece. Finally twenty-four schools accepted to participate in the study achieving a response rate of 85.72%. The schools were allocated randomly to the four groups of the study. A total of 180 people participated and a total of 283 questionnaires were collected. The allocation can be seen in the Flow Diagram of the progress of the school cluster randomization (Figure 1). There was no loss of participants. The CONSORT statement: extension to cluster randomised trial (Campbell et al, 2004) was taken under consideration.

Study Instrument

Literature review yielded first aid questionnaires either too big or for experts. The need for an instrument corresponding to the school personnel's needs led to the development of a questionnaire based on literature (Baltopoulos, 2001; Papadimitriou-Papakosta, 2004; Makos et al, 2005). The questionnaire requires approximately ten minutes to be answered and it includes nine close questions on sample characteristics, three close questions on training and experience on first aid and twenty-five knowledge questions with the following answering patterns: Right, Wrong and I do not know. The questions are grouped in thematic categories (General questions, Basic CPR, Wounds/Hemorrhage, Foreign Particles, Bites, Allergies, Sunstroke, Injuries, and Poisoning).

Instrument's validity and reliability

For ensuring validity the questionnaire was based on literature and it was checked by two experts for mistakes and omissions. Also, it was distributed to five postgraduate students to comment on clarity and readability (Burns & Grove, 2009).

Reliability testing focused on stability and homogeneity (Burns & Grove, 2009). Test-retest reliability was checked on Groups 1 and 3 that answered the questionnaire twice. A correlation analysis was performed on the scores of the two observations. For intervention Group 1 correlation coefficient was r_s=0.44 ($p<.001$) and for control Group 3 was r_s=0.92 ($p<.001$). Homogeneity was tested by calculating Cronbach's alpha and by performing a factor analysis. The calculation yielded a Cronbach's alpha=0.79 for the four groups (N=180). Sampling adequacy was tested by using the Kaiser-Meyer-Olkin coefficient (KMO=0.78) and factor analysis yielded nine factors that explained 61% of the variance in participants' answers.

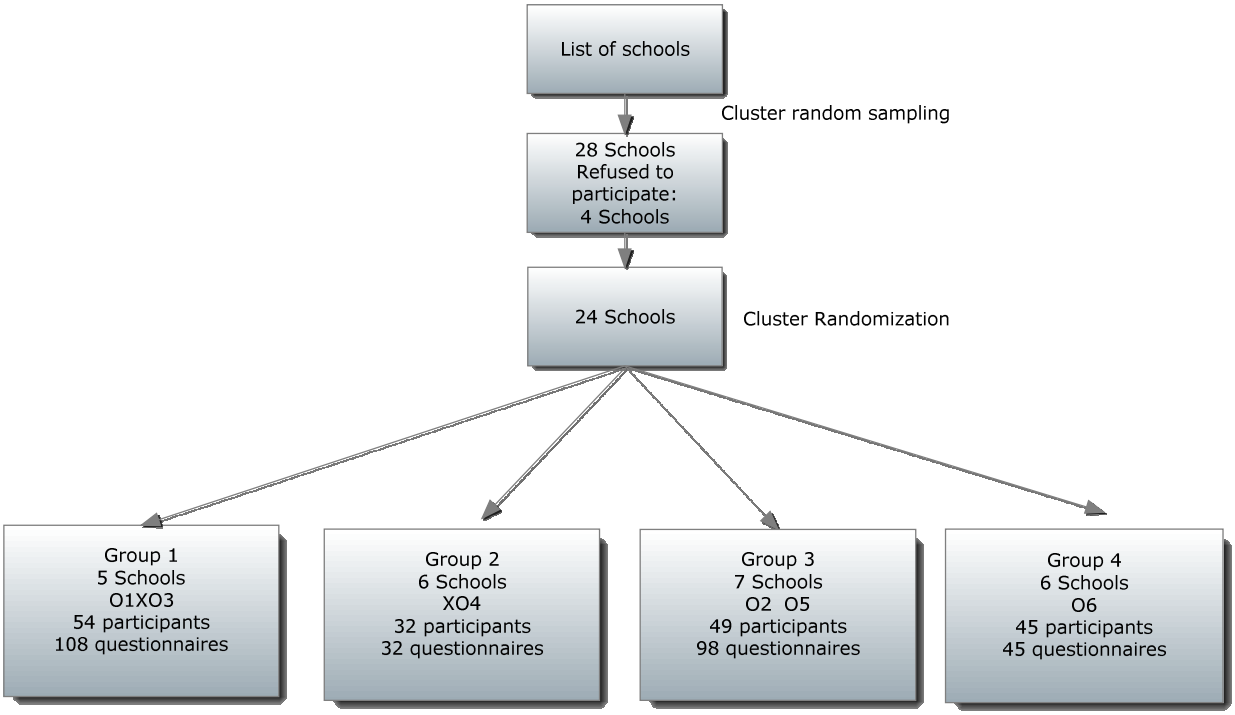

Figure 1. Flow Diagram of the progress of the school cluster randomization

Statistical analysis

For the statistical analysis the SPSS.16 (2007) for Windows was used. Significance level was set at alpha≤0.05 for two sided test. Non parametric statistical tests were used as the data did not follow normal distribution. Chi square test was used for testing categorical variables. U Mann-Whitney test was used for testing categorical and continuous variables for two independent samples, while Wilcoxon test was used for paired samples. Kruskal-Wallis one way ANOVA was used for testing variables for more than two groups. Last, Spearman correlation coefficient (r_s) was used for testing continuous data.

Results

Sample characteristics

The sociodemographic of the sample are presented in table 2. It has to be mentioned that in Greece there are three categories of personnel facilitating special education schools: (a) teachers of special education, (b) specialists such as school nurses, psychologists, occupational therapists, social workers, speech therapists, physiotherapists, and (c) assistant personnel. Categories of special needs referred by the participants other than those proposed in the questionnaire were autism, developmental disorders, psychosocial and multiple disabilities. Table 3 presents participants' answers on First Aid experience.

Knowledge results

Wrong answers were scored by zero points, I do not know answers were scored by 1 point, and Right answers were scored by three points. Total score ranged from 0 to 75 points. For each thematic category the score was: General questions 0-9 points (3 questions), Cardiopulmonary resuscitation 0-18 points (6 questions), Wounds/Hemorrhage 0-12 points (4 questions), Particles 0-6 points (2 questions), Bites 0-3 points (1 question), Allergies 0-6 points (2 questions), Sunstroke 0-6 points (2 questions), Injuries 0-9 points (3 questions), and Poisoning 0-6 points (2 questions).

Table 4 presents the mean score in each knowledge indicator. Intervention groups (groups 1 & 2) improved their score respectively to control groups (groups 3 & 4). Table 5 presents the mean scores in thematic categories. Table 6 presents hypotheses testing on whether participants' knowledge scores among the four groups were statistically significantly different before and after the health educational program. Statistically significant results were found only by comparing intervention groups (groups 1 & 2) to control groups (groups 3 & 4) showing that the

difference in knowledge was due to the intervention. There was not found any correlation between score of knowledge and any other variable (gender, age, academic qualification, previous training etc) ($p>0.05$).

Table 2: Sample characteristics

Variables	*Answer categories*	*Sample n=180 (%)*	*Intervention groups*		*Control groups*	
			Group 1 n =54 (%)	*Group 2 n =32 (%)*	*Group 3 n =49 (%)*	*Group 4 n =45 (%)*
Gender	**Male**	**44 (24.4)**	**12 (22.2)**	**7 (21.9)**	**14 (28.6)**	**11 (24.4)**
	Female	**136 (75.6)**	**42 (72.8)**	**25 (78.1)**	**35 (71.4)**	**34 (75.6)**
Age	**< 25**	**11 (6.1)**	**3 (5.6)**	**-**	**4 (8.2)**	**4 (8.9)**
	25-34	**57 (31.7)**	**18 (33.3)**	**12 (37.5)**	**12 (24.5)**	**15(33.3)**
	35-44	**55 (30.6)**	**21 (38.9)**	**5 (15.6)**	**17 (34.7)**	**12 (26.7)**
	45-54	**46 (25.6)**	**10 (18.5)**	**11 (34.4)**	**15 (30.6)**	**10 (22.2)**
	> 55	**11 (6.1)**	**2 (3.7)**	**4 (12.5)**	**1 (2)**	**4 (8.9)**
Level of education	**University**	**138 (76.7)**	**44 (81.5)**	**24 (75)**	**36 (73.5)**	**34 (75.6)**
	Technological	**17 (9.4)**	**2 (3.7)**	**5 (15.6)**	**6 (12.2)**	**4 (8.9)**
	Secondary	**25 (13.9)**	**8 (14.8)**	**3 (9.4)**	**7 (14.3)**	**7 (15.6)**
	Compulsive	**-**	**-**	**-**	**-**	**-**
Academic qualification	**Yes**	**112 (62.2)**	**38 (70.4)**	**19 (59.4)**	**30 (61.2)**	**25 (55.6)**
	No	**68 (37.8)**	**16 (29.6)**	**13 (40.6)**	**19 (38.8)**	**20 (44.4)**
Categories of academic qualification (N=111)	**Diploma**	**24 (21.6)**	**10 (27)**	**7 (36.8)**	**6 (20)**	**1 (2.2)**
	BSc	**45 (40.5)**	**11 (29.7)**	**7 (36.8)**	**13 (43.3)**	**14 (31.1)**
	MSc	**33 (29.7)**	**12 (32.4)**	**4 (21.1)**	**9 (30)**	**8 (17.8)**
	PhD	**6 (5.4)**	**2 (5.4)**	**1 (5.3)**	**2 (6.7)**	**1 (2.2)**
	Other	**3 (2.7)**	**2 (5.4)**	**-**	**-**	**1 (2.2)**
Current studies (N=178)	**Yes**	**24 (13.5)**	**10 (18.5)**	**-**	**6 (12.2)**	**35 (18.6)**
	No	**154 (86.5)**	**44 (81.5)**	**32 (100)**	**43 (87.8)**	**8 (81.4)**
School personnel category	**Teachers**	**101 (56.1)**	**31 (57.4)**	**18 (56.2)**	**27 (55.1)**	**25 (55.6)**
	Specialists/Therapists	**54 (30)**	**16 (29.6)**	**10 (31.2)**	**15 (30.6)**	**13 (28.9)**
	Assistants	**25 (13.9)**	**7 (13)**	**4 (12.5)**	**7 (14.3)**	**7 (15.6)**
Pupils' special need categories (Iintellectual disabilities=1, Mobility disabilities=2, Deafness=3, Blindness=4, Other=5)	***Iintellectual disabilities***	**34 (18.9)**	**4 (7.4)**	**8 (25)**	**15 (30.6)**	**7 (15.6)**
	Mobility/Physical disabilities	**3 (1.7)**	**-**	**3 (9.4)**	**-**	**-**
	Deafness	**3 (1.7)**	**-**	**-**	**3 (6.1)**	**-**
	Blindness	**11 (6.1)**	**11 (20.4)**	**-**	**-**	**-**
	Other	**12 (6.7)**	**1 (1.9)**	**2 (6.2)**	**9 (18.4)**	**-**
	1+2	**13 (7.2)**	**3 (5.6)**	**6 (18.8)**	**2 (4.1)**	**2 (4.4)**
	1+4	**1 (0.6)**	**1 (1.9)**	**-**	**-**	**-**
	1+5	**71 (39.4)**	**28 (51.9)**	**7 (21.9)**	**16 (32.7)**	**20 (44.4)**
	1+2+3+5	**3 (1.7)**	**3 (5.6)**	**-**	**-**	**-**
	1+3+5	**3 (1.7)**	**2 (3.7)**	**-**	**-**	**1 (2.2)**
	1+2+5	**24 (13.3)**	**1 (1.9)**	**5 (15.6)**	**4(8.2)**	**14 (31.1)**
	1+2+3	**1 (0.6)**	**-**	**1 (3.1)**	**-**	**-**
	1+4+5	**1 (0.6)**	**-**	**-**	**-**	**1 (2.2)**
Years of experience x± SD (N=175)		**7.33±7.44**	**7.53±6.64**	**9.93±10.2**	**7.44±6.88**	**5.1±5.8**

Table 3 Answers on First Aid experience

Variables	*Answer categories*	*Sample N=180 (%)*	*Intervention groups*		*Control groups*	
			Group 1 N=54 (%)	*Group 2 N=32 (%)*	*Group 3 N=49 (%)*	*Group 4 N=45 (%)*
First Aid training (N=179)	Yes	60 (33.5)	17 (31.5)	11 (34.4)	16 (32.7)	16 (36.4)
	No	119 (66.5)	37 (68.5)	21 (65.6)	33 (67.3)	28 (63.6)
Experience of giving First Aid	Yes	76 (42.2)	21 (38.9)	12 (37.5)	19 (38.8)	24 (53.3)
	No	114 (57.8)	33 (61.1)	20 (62.5)	30 (61.2)	21 (46.7)
Environment of delivering First Aid (N=76)	School setting	44 (57.9)	13 (61.9)	7 (58.3)	12 (63.2)	12 (50)
	Out school activity	8 (10.5)	2 (9.5)	3 (25)	1 (5.3)	2 (8.3)
	Both	24 (31.6)	6 (28.6)	2 (16.7)	6 (31.6)	10 (41.7)

Table 4 Means and standard deviation in total score and knowledge indicators

Knowledge	*Intervention groups*			*Control groups*		
	Group 1 N=54		*Group 2 N=32*	*Group 3 N=49*		*Group 4 N=45*
	Pre test	*Post test*	*Post test only*	*Pre test*	*Post test*	*Post test only*
Total score	38.1±6.95	52.91±11.59	52.25±8.73	37.35±6.41	37.45±6 .26	37.29±7.31
Correct knowledge	42.44±13.02	67.41±19.21	66.88±13.83	43.51±11.45	44.16±11.8	40.18±13.35
Perceived knowledge	75.78±16.73	91.56±15.18	91.75±10.31	77.96±17.93	79.1±18.3	74.22±18.72
Accuracy of knowledge	55.72±10.73	72.62±14.45	72.43±11.92	56.46±11.31	56.5±11.44	54.72±13.69
Number of correct answers	10.61±3.25	16.85±4.8	16.72± 3.46	10.88±2.86	11.04±2 .95	10.04±3.34
Number of wrong answers	8.33±2.67	6.04±3.05	6.22±2.47	8.61±3.25	8.73±3.31	8 .51±3.45
Number of Do Not Know answers	6.06±4.18	2.11±3.8	2.1±2.58	5.49±4.49	5.22±4.57	6.5 3±4.59

Table 5 Means and standard deviation in total score of knowledge by thematic category

Subject category	*Intervention groups*			*Control groups*		
	Group 1 N=54		*Group 2 N=32*	*Group 3 N=49*		*Group 4 N=45*
	Pre test	*Post test*	*Post test only*	*Pre test*	*Post test*	*Post test only*
General questions	**6.15±1.62**	**7.56±1.78**	**6.88±1.74**	**6.16±1.75**	**6.18±1.75**	**5.86±2.1**
CPR	**7.8±2,64**	**11.56±3.8**	**12.16±3.28**	**6.39±2.68**	**6.25±2.76**	**7.58±2.48**
Wounds Hemorrhage	**7.52±2.15**	**8.7±2,1**	**8.9±2**	**7.59±1.68**	**7.55±1.6**	**7.53±2.32**
Particles	**3.4±1.65**	**4.9±1.56**	**5.37±1.13**	**4.1±1.72**	**4.14±1.74**	**3.73±1.62**
Bites	**0.65±1.01**	**2.02±1.37**	**1.78±1.49**	**0.47±1**	**0.43±0.94**	**0.16±0.367**
Allergies	**2,94±1.86**	**3.7±1.9**	**3.1±2.15**	**2.84±1.89**	**2.82±1.98**	**2.33±1.74**
Sunstroke	**3.72±1.74**	**4.96±1.6**	**4.81±1.53**	**4.4±1.75**	**4.45±1.66**	**4.04±1.75**
Injuries	**4.12±1.89**	**5±1.96**	**4.53±2.1**	**4.16±1.75**	**4.29±1.7**	**4.4±1.48**
Poisoning	**1.82±1.87**	**4.48±2.2**	**4.72±1.85**	**1.27±1.41**	**1.35±1.48**	**1.64±1.38**

Table 6 Tests among the four groups for statistical significant differences in knowledge scores

Test for differences between/among:	Statistical test	Value	p_{value}
Group 1 Total score pre test-post test	Wilcoxon	z=-5.713	<.001
Group 1 Correct knowledge pre test-post test	Wilcoxon	z=-5.587	<.001
Group 1 Perceived knowledge pre test-post test	Wilcoxon	z=-5.295	<.001
Group 1 Accuracy of knowledge pre test-post test	Wilcoxon	z=-5.579	<.001
Group 1 Number of correct answers pre test-post test	Wilcoxon	z=-5.587	<.001
Group 1 Number of wrong answers pre test-post test	Wilcoxon	z=-4.475	<.001
Group 1 Number of Do Not Know answers pre test-post test	Wilcoxon	z=-5.295	<.001
Group 3 Total score pre-post pre test-post test	Wilcoxon	z=-0.211	0.833
Group 3 Correct knowledge pre-post pre test-post test	Wilcoxon	z=-0.604	0.546
Group 3 Perceived knowledge pre test-post test	Wilcoxon	z=-1.633	0.102
Group 3 Accuracy of knowledge pre test-post test	Wilcoxon	z=0.000	1.000
Group 3 Number of correct answers pre test-post test	Wilcoxon	z=-0.604	0.546
Group 3 Number of wrong answers pre test-post test	Wilcoxon	z=-1.403	0.161
Group 3 Number of Do Not Know answers pre test-post test	Wilcoxon	z=-1.473	0.141
Group 1 & 3 Total score pre test	Mann-Whitney	U=1271.5	0.733
Group 1 & 3 Correct knowledge pre test	Mann-Whitney	U=1234.5	0.556
Group 1 & 3 Perceived knowledge pre test	Mann-Whitney	U=1197	0.404
Group 1 & 3 Accuracy of knowledge pre test	Mann-Whitney	U=1292.5	0.840
Group 1 & 3 Number of correct answers pre test	Mann-Whitney	U=1234.5	0.566
Group 1 & 3 Number of wrong answers pre test	Mann-Whitney	U=1217.5	0.483
Group 1 & 3 Number of Do Not Know answers pre test	Mann-Whitney	U=1191.5	0.384
Group 1 & 2 Total score post test	Mann-Whitney	U=756.5	0.336
Group 1 & 2 Correct knowledge post test	Mann-Whitney	U=735	0.247
Group 1 & 2 Perceived knowledge post test	Mann-Whitney	U=713	0.153
Group 1 & 2 Accuracy of knowledge post test	Mann-Whitney	U=807	0.610
Group 1 & 2 Number of correct answers post test	Mann-Whitney	U=735	0.247
Group 1 & 2 Number of wrong answers post test	Mann-Whitney	U=773	0.412
Group 1 & 2 Number of Do Not Know answers post test	Mann-Whitney	U=713	0.153
Group 1 & 3 Total score post test	Mann-Whitney	U=400	<.001
Group 1 & 3 Correct knowledge post test	Mann-Whitney	U=455.5	<.001
Group 1 & 3 Perceived knowledge post test	Mann-Whitney	U=651	<.001
Group 1 & 3 Accuracy of knowledge post test	Mann-Whitney	U=517	<.001
Group 1 & 3 Number of correct answers post test	Mann-Whitney	U=455.5	<.001
Group 1 & 3 Number of wrong answers post test	Mann-Whitney	U=684	<.001
Group 1 & 3 Number of Do Not Know answers post test	Mann-Whitney	U=651	<.001

Table 6 (continue)			
Test for differences between/among:	**Statistical test**	**Value**	p_{value}
Group 1 & 4 Total score post test	Mann-Whitney	U=356	<.001
Group 1 & 4 Correct knowledge post test	Mann-Whitney	U=342.5	<.001
Group 1 & 4 Perceived knowledge post test	Mann-Whitney	U=485.5	<.001
Group 1 & 4 Accuracy of knowledge post test	Mann-Whitney	U=456.5	<.001
Group 1 & 4 Number of correct answers post test	Mann-Whitney	U=342.5	<.001
Group 1 & 4 Number of wrong answers post test	Mann-Whitney	U=669	<.001
Group 1 & 4 Number of Do Not Know answers post test	Mann-Whitney	U=456.5	<.001
Group 2 & 3 Total score post test	Mann-Whitney	U=134	<.001
Group 2 & 3 Correct knowledge post test	Mann-Whitney	1 U=45.5	<.001
Group 2 & 3 Perceived knowledge post test	Mann-Whitney	U=431.5	<.001
Group 2 & 3 Accuracy of knowledge post test	Mann-Whitney	U=256.5	<.001
Group 2 & 3 Number of correct answers post test	Mann-Whitney	U=145.5	<.001
Group 2 & 3 Number of wrong answers post test	Mann-Whitney	U=408.5	<.001
Group 2 & 3 Number of Do Not Know answers post test	Mann-Whitney	U=431.5	<.001
Group 2 & 4 Total score post test	Mann-Whitney	U=142	<.001
Group 2 & 4 Correct knowledge post test	Mann-Whitney	U=119.5	<.001
Group 2 & 4 Perceived knowledge post test	Mann-Whitney	U=281	<.001
Group 2 & 4 Accuracy of knowledge post test	Mann-Whitney	U=231.5	<.001
Group 2 & 4 Number of correct answers post test	Mann-Whitney	U=119.5	<.001
Group 2 & 4 Number of wrong answers post test	Mann-Whitney	U=409.5	<.001
Group 2 & 4 Number of Do Not Know answers post test	Mann-Whitney	U=259.5	<.001
Group 3 & 4 Total score post test	Mann-Whitney	U=1063	0.765
Group 3 & 4 Correct knowledge post test	Mann-Whitney	U=890.5	0.107
Group 3 & 4 Perceived knowledge post test	Mann-Whitney	U=922	0.170
Group 3 & 4 Accuracy of knowledge post test	Mann-Whitney	U=1017.5	0.520
Group 3 & 4 Number of correct answers post test	Mann-Whitney	U=890.5	0.107
Group 3 & 4 Number of wrong answers post test	Mann-Whitney	U=1036.5	0.615
Group 3 & 4 Number of Do Not Know answers post test	Mann-Whitney	U=902.5	0.129
All groups Total score post test	Kruskal-Wallis	χ^2=74.383	<.001
All groups Correct knowledge post test	Kruskal-Wallis	χ^2=74.173	<.001
All groups Perceived knowledge post test	Kruskal-Wallis	χ^2=42.604	<.001
All groups Accuracy of knowledge post test	Kruskal-Wallis	χ^2=55.256	<.001
All groups Number of correct answers post test	Kruskal-Wallis	χ^2=74.173	<.001
All groups Number of wrong answers post test	Kruskal-Wallis	χ^2=29.346	<.001
All groups Number of Do Not Know answers post test	Kruskal-Wallis	χ^2=44.9	<.001

Discussion

The majority of the participants were female with a university degree. Half of them were teachers and most had further academic qualifications (second bachelor, master degree etc). Most served pupils with intellectual disabilities and autism that needed expertise and experience although participants varied in years of work experience. The frequencies of sample characteristics were approximately the same in the four groups. Similarly to the study of Baser et al (2007) the majority was not trained in first aid. Nonetheless half of them dealt at least once in their life with a school health emergency which is evident of the frequency of such events in the school setting.

Participants' first aid knowledge before the intervention was not sufficient particularly in relation to basic CPR and to very life-threatening situations (table 5). At the completion of the educational program intervention groups improved their performance, while controls remained at the same level. Furthermore, intervention groups improved the mean number of correct answers and reduced the mean number of wrong and unawareness answers (table 4).

In relation to knowledge indicators (table 4) high performance in correct knowledge practically shows that the participants in the intervention groups would eventually deal with a threatening situation with right handlings. High performance in perceived knowledge shows that insecurity and doubting in relation to providing first aid were reduced. Last, high performance in the accuracy of knowledge shows that intervention groups understood the educational program and acquired a sufficient level of knowledge.

Of course training in First Aid by itself does not guarantee the ability and the immediate response to an emergency especially when there has been a long time since the education program. Thus, continuing education in first aid is recommended (Eisenburger & Safar, 1999; Stign et al, 2009).

In relation to gender (table 6) the results differ from the studies done by Veskouki (2002) and Trifoni et al (2005). This difference in findings can be explained if the age groups of the study samples are taken under consideration. Both aforementioned studies refer to adolescent students where girls usually tend to be more diligent and careful in comparison to boys, while the present study refers to adults.

Regarding the study's hypotheses the level of knowledge and knowledge indicators improved by the completion of the educational program. However, the results fail to support that women perform better than men. Based on the findings and the research design first aid knowledge was improved and the health education program was effective. Participants' first aid knowledge before the program was insufficient as shown by the knowledge indicators particularly in relation to Basic CPR. After the program participants' performance improved and unawareness and insecurity were decreased. First aid health educational programs on the one hand might enhance knowledge and improve skills, but on the other hand training is imperative in regular intervals for knowledge maintenance.

Limitations of the Study

Although Solomon for group design, randomization and no loss of participants improved internal validity, 1:1 ratio in the number of participants among the four groups was not achieved (N_1=54, N_2=32, N_3=49, N_4=45). Participants in the clusters were approached for consent after randomisation that might raise the possibility of post-randomisation selection bias. The instrument used is sufficient for the needs of the present study but it can be improved. Because there was no pilot study no needs assessment was done and construct validity was tested a posteriori. The study used only outcome evaluation and also level of knowledge was assessed only prior and at the end of the program without having any repeated measures to estimate for knowledge maintenance as a result of time constraints because the time period approved by the ministry to conduct the program was limited. Last, the participants were not asked to evaluate the program by their perspective which would add to the program's improvement and to the evaluation of its effectiveness.

Conclusions and Implications for Practice

The first aid health education program succeeded to enhance school staff knowledge and to make school personnel more aware of the possible dangers and how to deal with them. In any case conducting similar studies is necessary both for improving research method and for exploring parameters that did not yield statistically significant results. Conducting first aid health

education programs is important for keeping the school personnel informed and trained. In addition to that these programs must be carried out by trained health professionals at regular intervals.

Acknowledgements: The author would like to thank all the people who accepted to participate in the study. As the paper was a part of a PhD thesis the author would also like to thank her dissertation committee members, Associate Professors of the University of Athens Athina Kalokerinou, RN, PhD and Panayota Sourtzi, RN, PhD and Assistant Professor Margarita Giannakopoulou RN, PhD for their help and advice.

References

Alexandropoulou M (2011) The effectiveness of first aid health education programs in the community: Critical review (in Greek). Hellenic Journal of Nursing Science (Greek) 4(4): 53-63

Bahari MB, Nur NM, Rahman AF (2003) A knowledge of asthma in school children. A survey among primary school teachers. Singapore Medical Journal 44(3):131-135

Baltopoulos G (2001) First Aid. (Hellenic Edition) P.X. Pashalidis Publications. Athens, Greece

Barrett LC (2001) Teaching teachers about school health emergencies. Journal of School Nursing. 17(6):316-322

Baser M, Coban S, Tasci S, Sungur Gonul, Bayat M (2007) Evaluating first aid knowledge and attitudes of a sample of Turkish primary school teachers. Journal of Emergency Nursing 33(5):428-432

Burns N, Grove SK (2009) The practice of Nursing Research. Appraisal, Synthesis, and Generation of Evidence. 6th Edition. WB Saunders Company, Philadelphia, PA, USA

Campbell MK, Elbourne DR, Altman DG (2004) CONSORT statement: extension to cluster randomised trials. British Medical Journal 328:702-708

Downie RS, Fyfe C, Tannahill A (1992) Health promotion: Models and values, Oxford university press, pp 27

Draijer J., Williams T. (1991) School health education and promotion in the members states of the EEC. The Commission of the EEC

Dugdale AE, Chandler D, Baglurst K (1979) Knowledge and belief in nutrition. American Journal of Clinical Nutrition 32:441-445

Eisenburger P, Safar P (1999) Life supporting first aid training of the public - review and recommendations. Resuscitation 41:3-18

Ewles L., Simnett I. (1995) Promoting Health. A practice guide. 3rd Edition. Chapman & Hall, London. p: 20-33

Green L.W., Kreuter M.W. (1999) Health promotion planning: An educational and ecological approach. 3rd ed. Mayfield publishing company, pp 1

Inman DD, Bakergem KM, LaRosa A, Garr DR (2011) Evidence-based health promotion programs for schools and communities. American Journal of Preventive Medicine 40(2)207-219

Larsson EM, Mártensson N, Alexanderson KAE (2002) First Aid training and bystander actions at traffic crashes – A population study. Prehospital and Disaster Medicine 17(3):134-141

Maben J., Macleod Clark J. (1995) Health promotion: a concept analysis. Journal of Advanced Nursing 22(6): 1158-1165

Makos K, Mparlas K, Hilaris S (2005) First Aid. Ministry of Education. Pedagogic Institution. Technological Vocational Education. Health care sector. A΄ class. Organization for school books publications. 7th Edition. (Hellenic Edition) Athens, Greece

Papadimitriou-Papakosta L (Editor) (2004) Adult basic life support provider manual (Hellenic Edition) European Resuscitation Council- Hellenic Resuscitation Council. Parisianos Scientific Publications Company. Athens, Greece

Sourtzi P (1998) Health Promotion: Historical Evolution (Greek). Primary Health Care (Greek). 10(4): 179-185

SPSS for Windows (2007) Release 16.0.0. Chicago, IL:SPSS Inc, USA

Stign V, Heselmans A, Roex A, Vandekerckhove P, Ramaekers D, Aertgeerts B (2009) Effectiveness of non resuscitative First Aid Training in laypersons: A systematic review. Annals of Emergency Medicine 54(3):447-457

Tones K., Green J. (2005) Health promotion: Planning and strategies. Sage Publications, pp 8

Trifoni R, Pavlidis GI, Bombaj DE, Palazi O, Vasiliadou A (2005) Basic Cardiopulmonary Resuscitation and Automated External Defibrillation: Knowledge of nursing students in TEI of Athens B Nursing Department. Nosileftiki 44(2):229-237

Veskouki G (2002) Assessment of the secondary education pupils' knowledge in the subject of first aid. Nosileftiki 41(4):451-463

Whitehead D. (2003) Health promotion and health education viewed as symbiotic paradigms: bridging the theory and practice gap between them. Journal of Clinical Nursing 12, 796-805

World Health Organization (1986) The Ottawa charter for Health Promotion **In** Kaplan A (ed) 1992: "Health Promotion and chronic illness. Discovering a new quality of health" Copenhagen: WHO Regional office for Europe, European Series No: 44, pp:2