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Motivation to Volunteer in Earthquake Mitigation Programme among Engineering Students*

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Lebanon has historically suffered from the effects of devastating earthquakes. To successfully mitigate the cataclysmic effects of such looming disasters, effective preparatory activities and response strategies relying on government resources, community engagement and volunteering programs are crucially essential. The objective of this study is to assess the willingness of engineering students to join earthquake risk reduction programs initiated and led by universities and to determine their motives behind such engagements. In addition, the study aims to identify the competencies of engineering students in supporting response operations when a future earthquake strikes. Lebanese senior and graduate engineering students ($n = 332$) were surveyed. The findings revealed a strong tendency for Lebanese engineering students to participate in such volunteering programs, and that learning and altruistic factors are the leading predictors behind the intended participation. However, engineering students showed poor competencies and skills that are essentially needed for such a mission. This study emphasises the role of universities and engineering educational and professional programs in earthquake risk mitigation and response operations in future earthquake disasters.

Keywords: volunteering programs; engineering students; motivation; earthquake risk reduction

1. Introduction

Volunteerism is essential in reducing vulnerability to natural disasters. In the event of a strong earthquake, people could be caught and trapped alive under the rubble of collapsed homes, buildings or working places, facing imminent death unless they are rescued promptly. It has been shown from recent earthquake devastations that loss of lives and long term effects can only be effectively reduced through planned response action programs that engage community trained volunteers led by credible organisations. A case study in the Nishi Suma area in Japan revealed that 60% of the residents affected by the Kobe earthquake in 1995 were evacuated by their own efforts, and approximately 20% were rescued by local volunteers [1]. These data signify the importance of community volunteer engagement in the immediate rescue operation. Similar observations were also found after the Marmara earthquake of 1999 in Turkey and the Gujarat earthquake of 2001 in India [2, 3]. Moreover, recent natural disasters have confirmed the limits of immediate governmental response and the critical needs of community volunteers to respond quickly until official emergency systems are organised, mobilized and functionalised [4]. While the government's response to the basic needs of distressed victims is characterised by limited personnel, volunteers are capable of flexibly responding, in large numbers, to the different needs of victims and their involvement becomes an absolute necessity [5].

Thus, the willingness of community members to volunteer is critical for the success of any disaster prevention strategy. Even government emergency units would not be able to respond sufficiently to the needs of the thousands of victims and evacuees without the engagement of trained and affiliated community volunteers. Engineers can play a drastic role in earthquake disaster prevention and response. Such a volunteering role is not only limited to the intervention in the wake of the crisis, but it is also crucial in the preparedness period prior to a disaster and in the vital long term recovery stage following earthquake disasters. For example, engineers are the ones who are capable of finding solutions in interrupted essential facilities and services that provide basic needs for the affected community after an earthquake, such as water supply and network distribution, telecommunication, electric power transmission, and transportation systems. Engineers can thus cope with nearly any type of infrastructure failure, challenge, or key issues that requires engineering skills and expertise. Therefore, engineering educational programs at universities are urged to emphasise the crucial role of engineers in earthquake risk reduction and mitigation, to encourage and support the participation of engineering students in volunteer programs and to

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enhance their skills for response operations during earthquake disasters.

Disaster volunteers are generally classified according to their expertise, as either specialist disaster volunteers who possess professional skills, or non-professional disaster volunteers, who are average citizens with no particular professional skills and who implement support activities in the disaster areas. The great majority of non-professional earthquake disaster volunteers have not participated in organised disaster prevention drills, have not received education during the pre-disaster stage, and have no previous experience of volunteering in disaster areas [6].

Whenever an earthquake strikes, heroic people of the community get more sympathetic and enthusiastic response regarding volunteering their times and efforts to help others. They are the earliest responders. However, most of these spontaneous volunteers fail to realise that such actions, which lacks both the training and skills for specific tasks and the affiliation with national or international reliable organisations or institutions, can actually complicate the rescue mission and may hinder its progress. Therefore, efforts must be made in the recruitment and integration of trained college student volunteers into dynamic volunteering programs organised and led by local universities to ensure effective and collaborated response action in the crucial time of earthquake disasters.

1.1 Earthquake hazard in Lebanon

The seismic activity in Lebanon has been observed and documented for more than 2000 years where strong earthquakes have ruined many cities and towns, transforming thousands of buildings into rubbles while leaving hundreds of thousands of casualties in the Eastern Mediterranean region. The seismic activities in Lebanon have triggered many earthquakes during the past 2000 years. However, the most notable and prominent ones were the earthquakes of 551 A.D., 1202 A.D. and 1759 A.D. The moment magnitudes of these earthquakes have been estimated to reach 7.5, while causing tremendous destruction in the coastal cities of Beirut, Tripoli, Jubail, Saida and Tyre as well as in the ancient and the glorious city of Baalbek. Geologists have shown that Lebanon is covered by seismic fault systems. The Dead Sea Transform (DST) is extremely important since it has been responsible for the bulk of seismic activity in the Eastern Mediterranean. It has originated from the interactions and collisions of the African and the Arabian plates. It is the deepest and most deadly fault system in the Eastern Mediterranean region, stretching from Ethiopia through Aqaba, Jordan, Lebanon and Syria to continue north to join the East Anatolian fault in Turkey. Such fault systems and their ramifications have proved to be the origin of several catastrophic and deadly earthquakes throughout the history of Lebanon [7].

The Mount Lebanon Thrust (MLT) is another active major fault recently discovered along the coast between Beirut and Enfeh [8]. The disastrous 7.5 moment magnitude earthquake occurred on 9 July, 551 A.D. on this fault and destroyed most of the coastal cities of Lebanon. Scientists have suggested that the returning period for similar earthquakes on the same fault is between 1500 and 1750 years. The earthquake of 20 May 1202 A.D., which caused severe destruction in Beirut and Damascus was estimated to have an equivalent moment magnitude of around 7.5 [8, 9]. The year 1759 A.D. witnessed two significant seismic events on 30 October and 25 November. The equivalent moment magnitudes of these events were approximately 6.7 and 7.4 respectively [9].

Recently, there have been quite a few sizable earthquakes that struck Lebanon. However, the seismicity of Lebanon is highly complex, and it has been characterised by strong earthquakes with long returning periods.

Based on previous earthquakes documentation, growing urbanization along the coastal region, the lack of seismic code implementation and inadequate community preparation, experts believe that Lebanon is not only vulnerable to earthquakes but to a major one that is long overdue [10, 11]. The resulted casualties from such an event can reach tens of thousands, while the economical losses can be estimated in billions of dollars.

This study intends to identify the motives behind the willingness of engineering students to participate in earthquake volunteering programmes. Also, this article calls for the need of transforming capable and motivated Lebanese students into semi-professional volunteers through the implementation of specialised volunteering programmes led by universities across the country.

2. Purpose of the study

For the purpose of this study, earthquake disaster volunteerism is defined as planned voluntary action intended to help others prepare for, respond to, and recover from an earthquake disaster. Engineering programmes across most Lebanese Universities have recently witnessed a drastic increase in student enrolment [12]. Due to the influential role of engineering students in the society, and their future leadership positions in advancing policies and implementing strategies, this study seeks to investigate the predictor factors for their willingness to assume responsibilities during earthquake disasters

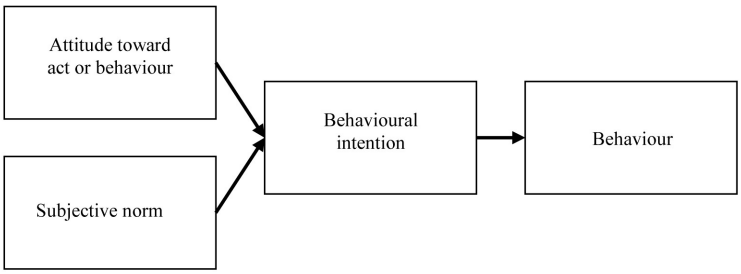

Fig. 1. Components of the Theory of Reasoned Action (TRA).

and to serve as volunteers to mitigate earthquake risk and to engage in immediate response action, considering Lebanon as a case study.

Traditionally, governments in Lebanon have never prioritised earthquake threats due to the frequent political turmoil and internal conflict crises. In fact, higher education programmes in Lebanon do not cover any aspects of earthquake disaster awareness and preparedness, and no commitment to seismic hazard reduction has been noticed throughout the last few decades [13]. Moreover, there is a lack of awareness campaigns, community engagement and disaster volunteer programmes in the country.

Very little has been written on the motivations of engineering college students to volunteer for earthquake disaster risk reduction programmes. Although volunteering for such a cause seems appealing and beneficial to student learning, no attempt has been made to assess the Lebanese college students' willingness to participate and their readiness to engage in volunteering programmes for mitigation of earthquake disaster. This study will shed light on the influential factors that motivate engineering students in Lebanon to engage in such a mission. This investigation brings insights into the current situation as well as contributing to the literature by providing a deeper understanding of how and why engineering students develop an interest or a lack of interest in natural disaster volunteering. Also, the findings of this research will act as a foundation for the development of any future student volunteering program in Lebanon. This research attempts to answer the following questions:

- What is the level of awareness of Lebanese engineering students regarding future earthquakes in Lebanon?
- What are the motives behind the willingness of engineering students' participation in earthquake disaster risk reduction volunteering programmes?
- What are the skills and expertise that engineering students possess for such a volunteering mission?

3. Theoretical framework

The Theory of Reasoned Action (TRA) helps to characterise human behaviour as intentional and rational. This model provides a social psychological framework proved to be useful in explaining several types of behaviour [14, 15]. It suggests that someone's behavioural intention depends on their attitude and subjective norm as shown in Fig. 1. The attitude toward the behaviour is someone's overall evaluation of the behaviour, including their beliefs about the consequences of this behaviour and the corresponding positive/negative judgment about each feature of this behaviour. The subjective norm is the individual's own estimate of the social pressure to perform/not perform this behaviour, or in other words the influence of people in one's social environment.

This framework will help predict the intention to join earthquake volunteer programmes. Constructs of the TRA model have already been measured and validated in previous studies related to volunteer activities [16].

Because choosing to volunteer in earthquake disaster programmes represents great challenges and responsibility, the focus of this study is to identify and discuss these factors in terms of attitudes and the subjective norm by using a Likert-scaled survey. This survey will help to better understand what and how 'important' these factors are to engineering students as part of their involvement in such endeavour.

4. Methodology

For the purpose of this research, senior and graduate engineering students at the public Lebanese University (LU) and the American University of Beirut (AUB) were targeted. As of spring 2013, the total enrolment of senior and graduate engineering students in both institutions was 1241. The sample was intended to ensure the participation of students living in the most urbanized, highly-populated and seismically exposed cities in Lebanon. Professors from different engineering specialisations in the

targeted universities were contacted and asked to distribute the survey to their students. The survey invites students to voluntary participate while ensuring them of complete anonymity. The survey was randomly distributed and data collection ended when it reached 25% of the targeted population [17].

The survey included three sections: the first section gathered demographic information about participants, the second section investigated students' awareness of earthquake disaster, their willingness to join an earthquake volunteering programme and their area of expertise for such cause. The third section of the survey asked participants to rate 19 items on a scale of 5 that reflect their attitudes and subjective norm toward volunteering in an earthquake risk reduction programme based on the theoretical framework (TRA). Items were designed to be aligned with volunteerism functions that were hypothesized in previous research studies [18]:

1. *Values* that refers to contributions to the society and helping people who are in need. This function was also associated with altruism [19].
2. *Understanding* in which volunteerism gives an opportunity to learn, understand, practice and apply skills. This function is related to the knowledge function.
3. *Career* that serves to increase one's job opportunities and consequently improve his/her career.
4. *Social* in which an individual volunteers due to social pressure or to satisfy people in one's social environment.
5. *Protective,* where volunteering is to reduce concerns about those people who are less fortunate.
6. *Esteem* or *enhancement,* where volunteerism serves to increase self-confidence.

The 19 Likert-scaled items related to the subjective norm and attitudes revealed a reliability of 0.90. Descriptive statistics were calculated to obtain the measures of central tendency as well as the measures of variability of each of the identified items.

5. Findings

Participants (n = 332) were almost equally distributed between LU (51%) and AUB (49%); mostly male (66%) with only (34%) female. The sample was distributed among the most highly urbanized region as follows: North Lebanon (29%), Mount Lebanon (37%) and Beirut (34%).

Participants were asked to rate on a scale of 5 their awareness of future earthquake and their interest in joining an earthquake volunteering programme as shown in Table 1.

Also, engineering students were asked to specify the area of expertise that they can best provide to minimise the effects of earthquake disaster. Table 2 shows the list of expertise and the corresponding frequencies.

In the last section of the survey, participants were asked to rate 19 items that reflects their attitudes toward volunteering in earthquake disaster programmes. Table 3 shows the frequencies along with the mean and standard deviation of participants' responses. Means that are above 4 on a scale of 5 are in bold, which reflects the significance of the corresponding item for participants.

An exploratory Factor Analysis (EFA) was used on the data in order to determine which of the 19 items formed related subsets. EFA combines into factors variables that are correlated with one another but are largely independent of other subsets of item [20]. This method was used as an expedient way to identify a smaller number of constructs (subsets) that represent the Likert-type items. As a means to form the potential factors, EFA was applied with principal components extraction, eigenvalues greater than 1.00, and an absolute value above 0.40. Results of the Kaiser–Meyer–Olkin (KMO) measure of sampling for students and engineers samples equal to 0.823, and the Bartlett's test ($p < 0.0001$) showed that using FA is appropriate for this study.

The EFA with the principal components extraction yielded five factors accounting for 62.28% of the total variance. Table 4 shows the rotated factor loadings, which are the correlations between the variable and the factor. The sizes of the loadings reflect the extent of the relationship between each variable and each factor. The higher the factor loading, the more the particular item contributes to the given factor. For items that were loaded under

Table 1. Participants' awareness and interest in joining an earthquake volunteering programme

Awareness and interest	Scale	(n = 332)
I am aware of the risk of future earthquakes in Lebanon.	Strongly disagree/Disagree Neutral Agree/ Strongly agree	15% 19% 66%
I am aware of the important need for volunteering to minimise earthquake risk.	Strongly disagree/Disagree Neutral Agree/ Strongly agree	16% 21% 63%
I am interested in joining an earthquake volunteering programme led by the university.	Strongly disagree/Disagree Neutral Agree/ Strongly agree	12% 27% 61%
I am interested in joining an earthquake volunteering program led by the government.	Strongly disagree/Disagree Neutral Agree/Strongly agree	26% 40% 34%

Table 2. The expertise that engineering students can best provide in volunteering to minimise earthquake disaster effects

Type of expertise	Frequencies
Help in earthquake awareness and preparedness campaign	54%
Recruit volunteers for earthquake risk reduction programme	25%
Distribute clean water and food	55%
Provide medical Aid for lightly injured people	29%
Work with disease control units	16%
Work with homeless people	39%
Conduct damage assessment	30%
Raise funds and donations for victims	30%
Operate equipment to remove rubble	23%
Work with orphanages or older survivors	37%
Provide emotional and psychological support	36%
Assess the needs and the challenges of rescue operations	23%
Perform buildings' inspection and evaluation	35%
Be part of the search and rescue team	46%
Work with GIS and technological tools	38%
Restore telecommunication and phone services	31%
Restore water supply and piping systems	32%

Table 3. Frequencies, mean and standard deviation of the items related to subjective norms and attitudes to volunteer in an earthquake disaster programme

	College Engineering Students (n = 332)				
	S. disagree/ Disagree	Neutral	Agree/ S. agree	Mean	SD
My friends motivate me to volunteer for such a cause.	35%	50%	15%	2.45	0.825
My parents motivate me to volunteer for such a cause.	30%	46%	24%	2.63	0.756
My university/professors motivate me to volunteer for such a cause.	46%	41%	13%	2.21	0.864
I will be rewarded by God.	31%	23%	46%	3.10	0.848
I will be remembered as a hero.	50%	38%	12%	2.10	0.762
It helps me learn something new.	*4%*	*11%*	*85%*	*4.65*	0.742
I will be liked by others.	44%	43%	13%	2.25	0.924
It makes me feel more important in the society.	26%	28%	46%	2.94	0.852
It makes me feel better about myself.	15%	14%	71%	3.42	0.745
It is good for my resume (CV).	19%	30%	51%	3.13	0.956
It will introduce me to new friends.	22%	22%	56%	3.14	0.826
It helps me learn to deal with people from different backgrounds.	*6%*	*20%*	*74%*	*4.40*	0.873
It helps me to get a better professional position or job.	30%	42%	28%	2.67	0.932
It allows me to gain new perspectives on things.	*5%*	*16%*	*79%*	*4.52*	0.946
It allows me to explore different career interests.	20%	28%	52%	3.85	0.864
It is an opportunity to make a difference to the lives of others.	*6%*	*16%*	*78%*	*4.52*	0.987
I feel compassionate toward people in need.	*8%*	*18%*	*74%*	*4.41*	0.841
I am concerned about those less fortunate than myself.	*7%*	*28%*	*65%*	*4.23*	0.894
My love for my country motivates me to volunteer for such a cause.	18%	32%	50%	3.80	0.975

two factors, only the highest loading was retained. factor1 reported a variance (σ^2 = 27.44%), factor2 (σ^2 = 11.98%), factor3 (σ^2 = 9.87%), factor4 (σ^2 = 8.16%) and factor5 (σ^2 = 4.83%).

After evaluation of the items loaded under each factor, descriptive names were generated. Factor1 was labelled Learning Attitude, factor2 was labelled Altruism attitude, factor3 was labelled Extrinsic attitude, factor4 was labelled Social Attitude, and factor5 was labelled Subjective norm. Four new variables were computed based on the mean of the items falling under each factor. In order to obtain the most important factor, one-way repeated measures ANOVA was applied on the four variables for each sample. Repeated measures ANOVA indicated significant differences among the four factor scores, ($F(4, 1324) = 463.448$, $p < 0.000$). Figure 2 shows that the learning attitude was shown as the most important for participants with a mean of (μ = 4.35), followed by the altruism attitude (μ= 4.01), the extrinsic attitude (μ= 2.89), the social attitude (μ=2.77) and the subjective norm (μ= 2.42).The post hoc tests using the Bonferroni technique indicated significance ($p < 0.0001$), except between the extrinsic and social attitudes, which have close values.

6. Discussion

The results showed that male respondents are almost the double the number of the female respondents. Having a low percentage of women in the

Table 4. Rotated factor matrix with extraction method: principal component. Rotation method: varimax with Kaiser normalization

Items for attitude and subjective norms	Component				
	Learning attitude	Altruism attitude	Extrinsic attitude	Social attitude	Subjective norm
It allows me to gain new perspectives on things.	0.722				
It allows me to explore different career interests.	0.703				
It helps me to learn to deal with people from different backgrounds.	0.656				
It helps me learn something new.	0.583				
I feel compassionate toward people in need.		0.847			
I am concerned about those less fortunate than myself.		0.839			
It is an opportunity to make a difference in the lives of others.		0.741		0	
I will be rewarded by God.		0.439			
My love for my country motivates me to volunteer for such a cause.		0.428			
It helps me to get a better professional position or job.			0.638		
It is good for my resume (CV).			0.517		
I will be liked by others.				0.801	
I will be remembered as a hero.				0.747	
It makes me feel more important in the society.				0.717	
It makes me feel better about myself.				0.514	
It will introduce me to new friends.				0.505	
My friends motivate me to volunteer for such a cause.					0.860
My parents motivate me to volunteer for such a cause.					0.825
My university/professors motivate me to volunteer for such a cause.					0.748

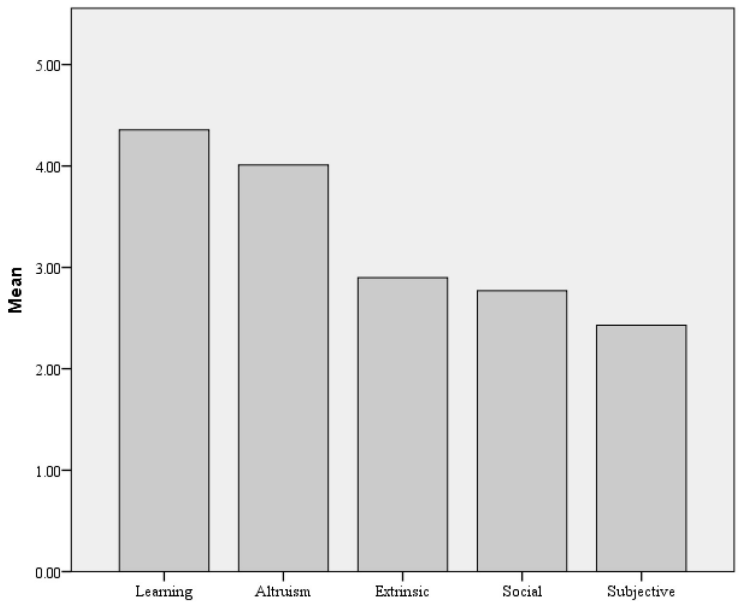

Fig. 2. Comparing the five types of motives to engage in the earthquake disaster programme.

engineering field is not surprising since several engineering education studies have discussed the unsatisfactory participation of women [P1]in the field [21, 22].

Although the engineering programmes in Lebanon do not cover earthquake risk education, the findings revealed that almost the two thirds (66%) of the respondents are aware of the risk of future earthquakes in Lebanon, while 19% are neutral and the remaining 15% are unaware. This implies that engineering students have learned about such hazard from external sources. Therefore, engineering curricula must be restructured and revolutionised to emphasise earthquake disaster education, to include courses in earthquake disaster mitigation and to encourage such mitigation through volunteering activities. Engineering students must be aware of the importance of the engineering profession in disaster prevention and mitigation as well as the indispensable role, knowledge and skills of engineers in advancing such mitigation efforts [23]. Engineering programmes should enhance the disaster-mitigation capacity of future engineers and should give them a sufficient number of elective courses to expand their skills and expertise in that domain. In addition, engineering programmes

should enhance the knowledge capacity of graduating engineers, to emphasise the values of disaster mitigation and to engage engineering students in disaster risk reduction activities, where a number of academic credits can be granted for volunteering efforts. Such steps would create safer and more resilient communities in the context of potential earthquake disasters.

Also, sixty three percent of respondents are aware of the important need of volunteering to minimise earthquake risk. This reflects the level of responsibility that engineering students have toward earthquake disaster mitigation.

When asked about their willingness to join an earthquake volunteering programme led by the university, the majority of participants (61%) showed their interest in such an activity. However, the number of participants decline to (34%) if the programme is led by the government. This result reflects that Lebanese students tend to trust the academic institutions more than the government agencies in leading volunteering programmes. This is probably due to the failure of government agencies in previous response to emergency crises, such as war refugees, wild fires and buildings collapse.

To explore to what extent these students are prepared to help in volunteering for activities, participants were asked to specify the area of expertise that they can best provide to minimise the effects of earthquake disaster. The findings showed that students have no expertise in disaster response. This implies that, although engineering students are enthusiastic toward joining an earthquake volunteering programme, they are not prepared or trained for such an activity. The only type of activity that half (54%) of the participants claimed possessing expertise for is in the area of earthquake awareness and the preparedness campaign. Consequently, academic institutions should endeavour to organise workshops and seminars to students related to disaster response, while taking advantage of the youths' enthusiasm and willingness to engage in volunteering activities.

The main purpose of this study was to investigate the engineering students' motives behind joining an earthquake volunteer programme. Participants were asked to rate 19 items that reflect their attitudes and subjective norms. The findings showed that the learning and altruism factors were the highest motivators toward such an engagement, followed by the extrinsic, social and subjective factors. These findings confirm previous research studies related to volunteerism. As such, Gidron [24] showed that high school and college students perceive volunteering as an opportunity to learn and as a self-development experience. Within the same inference, the '*understanding*' function, which gives the opportunity to learn, to understand and to practice was found as one of the essential functions of volunteering [18]. Also, Clary et al. [18] showed that the 'values' function, which was associated with altruism referring to the welfare of others and contributions to the community, is essential to volunteering. Moreover, Anderson and Moore (1978) provided empirical evidence that over 70% of the respondents perceive helping others as a motive for volunteering. Another study revealed that altruism and commitment to social work values were the strongest predictors of volunteering among 416 graduate and undergraduate social work students from four universities in the Gulf Coast area in the U.S. after the hurricanes Katrina and Rita [25]. A recent study analysed the motivations to volunteer of 5794 college students from six countries (USA, Canada, Belgium, China, Finland and Japan) and showed that students in all countries rated altruistic-driven motivations as the most relevant to their volunteering, followed by extrinsic-driven motivations, and social-driven motivations. The three scales were also significantly inter-correlated, indicating that volunteering is a combination of all the three types of motivations [26]. Therefore, the willingness to be altruistic and to engage in volunteer activities may require the expectations of some benefits for engineering college students, which is the possibility of learning and gaining new skills.

The findings of this study added an important aspect to the literature in the volunteerism field. It showed five factors that motivate engineering college students to volunteer in an earthquake while revealing the importance of the learning and altruism factors as being the highest valued by participants. These students are eager to learn from such volunteering activity while helping their community and society.

Surprisingly, the subjective norms factor is the lowest rated compared with the others. This implies that parents, friends and the university do not have influence on these students' enthusiasm. The reason behind such finding is most probably due to lack of awareness among parents, friends and the university regarding the danger and risks of earthquakes.

The initiation of volunteering programmes led by universities in developing and vulnerable countries to earthquakes is essential for effective earthquake disaster prevention, preparation and response. Such initiative is particularly important because it enhances the public awareness about seismic risk, while it can support search and rescue operations by providing specialised task teams with a wide range of skills leading to a great chance of saving lives and providing immediate support to earthquake victims. Certainly, such affiliated volunteer response would reduce the induced suffering and losses that

occur during and after earthquake disasters. In the end, engaging engineering students in disaster volunteering preparedness and response programmes will enrich their experience and prepare them for the future challenges. Also, such programmes advance and strengthen the collaboration between universities and their communities, leading to improvement of the overall resilience of the country, to prompt response and speedy recovery.

Engineering colleges in earthquake-prone countries, where response capacity is low, should encourage the implementation of volunteer programmes in which interested students can be trained for specific tasks and particular roles. It is important to realise that heroic acts alone will not yield the desirable outcomes unless they are accompanied by knowledge and training. Also, engineering educational programmes should provide students with incentives to become part of their volunteering effort and to initiate and sponsor volunteer fairs to recruit more students for such a service. Moreover, the spirit of volunteerism should become part of the global educational system in academic institutions, leading to transformational experiences that educate and develop leaders for better earthquake resilient communities and for implementation of earthquake disaster risk reduction strategies.

7. Limitations

This study is limited in that it focused on a specific group of participants, senior and graduate engineering students who are enrolled in two academic institutions in the Lebanon. Therefore these participants belong to a limited social group. Although the developed questions were very successful in revealing the motivational factors among engineering students in the Lebanon, they may not be applicable for other academic specialisations, age, or country. Similar studies are needed, especially in other developing countries, to verify and confirm the findings. In addition, a longitudinal research approach can be implemented to obtain global understanding of volunteerism among college students.

8. Conclusion

This study explicitly reveals that engineering students in the Lebanon are highly motivated to take part in well organised earthquake mitigation programmes. It revealed that intrinsic aspirations through learning and altruistic incentives are behind the willingness of engineering students' engagement in volunteering programme for earthquake risk reduction. Due to the existing seismic hazard in Lebanon, colleges of engineering are urged to assume responsibilities and prepare for this geological reality by creating earthquake volunteering programmes, building more research facilities, investing in early warning systems and assisting in preparing for such an imminent approaching disaster. Colleges and universities in regions where community resilience and response capacity are low should be aware of their potential role in the mitigation of earthquake disasters. Thus, it is hoped that the outcomes of this study will motivate university administrators and engineering educational leaders to act on this critical issue and take advantage of students' capital for the mitigation of earthquake risk in order to minimise losses and destructions.

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