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Original Article

Experiences and Psychological Influences in Lay Rescuers Performing Bystander Cardiopulmonary Resuscitation: A Qualitative Study

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Background: Bystander-initiated cardiopulmonary resuscitation (CPR) and the use of automated external defibrillation (AED) is pivotal in the community chain of survival, but little is known regarding the bystander experience of performing CPR and AED, and their psychological influence from the incidents in the Asian community. This qualitative study was conducted to explore the experiences of lay rescuers who had performed CPR and AED in public locations in Taiwan.
Methods: Lay rescuers who had provided initial CPR and defibrillation with AED in public locations across Taiwan in 2015 were selectively recruited from Taiwan Public AED Registry for a semi-structured interview.
Results: Nine participants were included in the study, and event-to-interview duration was within 1 year (n = 4) and 1–2 years (n = 5). The major findings from the study were: (1) the lay rescuers possessed helping traits and high motivation; (2) the lay rescuers reported certain aspects of rescue reality that differed much from prior training and expectations, including difficulty in the depth of chest compression, and uncertainties in real emergency situations; (3) the lay rescuers gained positive personal fulfillment in sharing their experience and receiving positive feedback from others, and were willing to help next time, although they experienced a short-term negative psychological impact from the event.
Conclusions: This study provides valuable information on strategies to increase layperson CPR rates and effectiveness in CPR training. Measures should be taken to increase layperson's confidence and situation awareness, reduce training-reality discrepancy, build up a support system to avoid negative psychological effects, and prepare lay rescuers for the next resuscitation.

Key words: *altruistic motivation, bystander-initiated CPR, layperson, psychological effect, training-reality discrepancy*

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Introduction

Bystander-initiated cardiopulmonary resuscitation (CPR) and bystander defibrillation improve survival rates and long-term functional outcomes of victims with out-of-hospital cardiac arrest (OHCA).[1] Dispatcher-assisted CPR programs and public access defibrillation (PAD) programs, which are beneficial for OHCA survival, are recommended by guidelines and implemented worldwide,[2-6] because both programs help to achieve early defibrillation.[7-9] Although bystander-initiated CPR and bystander defibrillation are beneficial to OHCA victims, such interventions provide the citizens with an unprecedented moral obligation to perform resuscitation on others; however, bystanders need to overcome the barriers of performing CPR. The lay rescuers might hesitate to offer rescue if they are unable to assess the seriousness of the victim's condition,[10-14] feel incapable,[15] worry about infectious diseases,[16-19] legal implications, and the possibility of causing damage to victims.[15,20]

Although most lay rescuers overcome these barriers to perform CPR, it has been shown that performing bystander CPR has short-term and long-term adverse psychological effects on the lay rescuers in Western countries.[21,22] In one study, lack of debriefing following the intervention and fatal victim outcome were found to be associated with negative bystander psychological reaction.[14] Recently, dispatcher-assisted CPR programs were initiated in Asian countries.[3,7] However, no study has been performed to understand the thoughts and cognitive conditions of the lay rescuers and the possible psychological effects on the lay rescuers in Asian countries. Owing to the unwanted aspects of bystander CPR experience reported in previous studies, and the cultural and religious differences between Asian and the Western countries, it is important to understand how bystander CPR affects the lay rescuers in different parts of the world.

Therefore, our study aimed to characterize the experiences surrounding bystander-initiated resuscitations and their psychological influences after the event in an Asian community.

Materials and Methods

Qualitative Approach

We used the grounded theory approach to qualitative research. The reason for this was to explore the resuscitating processes and the psychological effects in the lay rescuers in Taiwan before, during, and after performing CPR. Additionally, we also sought to identify unique themes existing in the lay rescuers, using a constructive paradigm.

Researcher Characteristics and Reflexivity

The research team comprised of psychologists, psychiatrists, emergency physicians, and emergency medical technicians. The trained interviewer (a master's student majoring in social psychology) had prior interview experience. There was no relationship between the researchers and the participants.

Settings

In Taiwan, when a cardiac arrest is suspected, the emergency medical service dispatcher dispatches two ambulances, one for basic and advanced life support, respectively.[23] The paramedics perform CPR and defibrillation using an automated external defibrillator (AED), give intravenous drugs, and intubate the victim on the scene. Since 2012, the PAD program has been implemented in Taiwan. Therefore, the lay rescuers can perform bystander CPR and defibrillation using publicly available AED, before the prehospital personnel arrives. In the PAD program, the contact information of lay rescuers who perform bystander CPR or defibrillation using public AED is recorded in the Taiwan Public AED Registry, which is maintained by the Ministry of Health and Welfare (MOHW), Taiwan.

Sampling Strategy and Ethical Issues

This study was approved by the Institutional Review Board of National Taiwan University Hospital (approval no. 201504028RIND), and subjects provided informed consent. Lay rescuers who performed resuscitation in 2015 were invited via email messages by MOHW officers on our behalf, to participate in our study.

Data Collection Methods

Lay rescuers who responded positively to the email concerning their interest in participating in the study, and who desired more information, received phone calls or email messages, explaining in detail the content of the study. If the lay rescuer agreed to join the study, an appointed date for an interview was then scheduled (Fig. 1).

Data Collection Instruments and Technologies

The in-depth face-to-face individual interview

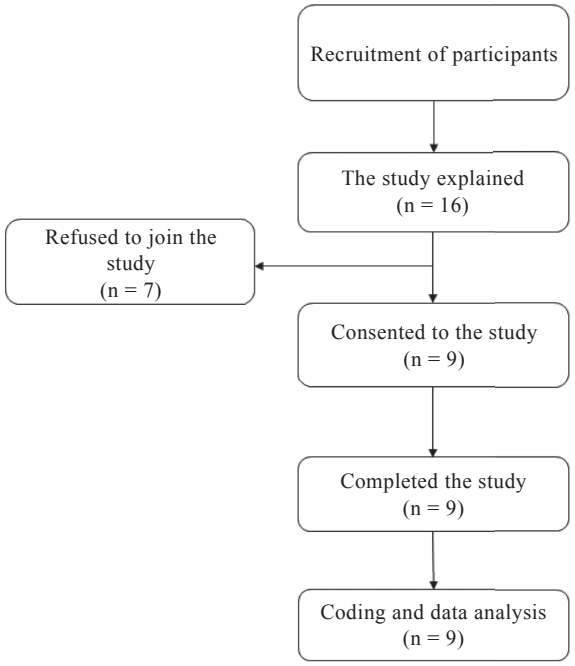

Fig. 1. Flow chart of the included study participant.

outline included 18 questions, based on altruism development model interview questions.[24] The questions have expert validity and were modified according to rescue scenarios. The content of the other interview outline focused on our study purposes. Participants were interviewed alone in a room. However, participants could be accompanied by other people if he/she felt uncomfortable to be interviewed alone.

Data Processing and Analysis

All interviews were audio-recorded. The recordings were transcribed verbatim, and proofread. During content analysis, the data were transformed into codes, composed of some words or sentences representing the meaning of the particular content. Then, similar codes were put together to present categories and subcategories within the categories. Two researchers analyzed the data to identify categories and subcategories separately. Then, they discussed with each other until a consensus was reached. The study was presented according to the Standards for Reporting Qualitative Research Recommendations.[25]

Results

There were 9 participants from five events who agreed to join the study, and all (5 men and 4 women) completed the interview. Four of them were sports coaches. All of the participants had a bachelor's degree or even higher. The time interval between the event and the interviews were < 1 year in about half of the participants (Table 1). The OHCA victims resuscitated by the participants all survived to hospital discharge.

The three categories developed after the content analysis following the interviews were: motivation, training-reality discrepancy, and psychological influence.

Motivation

The rescuers showed helping traits, individual cognition, and situation awareness, which were factors motivating the resuscitation efforts.

Helping Traits

All lay rescuers with altruistic behavior had acquired the knowledge and skills of CPR in the past. Previous professional experiences, personality, and competence in CPR skills enhance calmness and confidence in rescuers (Table 2).

> *"I was a sports player before. I thought such experience caused me not to feel so nervous during the event."* (No. 7)

> *"I felt that I could do better than other people,……and I tried saving his life using the skills that I remembered."* (No. 7)

One lay rescuer learned to help others through past experiences with their families and friends.

> *"When I was young, my family and friends affected my thought and behavior very much."* (No. 5)

Individual Cognition

During the event, some lay rescuers exhibited less confidence. They had difficulty in recognizing the victim's condition, and tried to check the consciousness and breathing of the victim repeatedly. Conflicting ideas were very common. One lay rescuer stated,

> *"I was not sure whether I should start to compress the chest of the victim, … and I felt I did not have enough skills."* (No. 8)

Another lay rescuer provided a similar response.

> *"We tried to confirm his pulses,……but I*

Table 1. Basic demographic information of the participants

Participant number	Age	Sex	Education level	Occupation	Participation in OHCA rescue before this index event	Training-to-event interval	Event-to-interview interval	Perceptions of the time before ambulance arrival	Outcome of the patient
1	35	Female	Bachelor's degree	Sports coach	N	6–12 months	1–2 years	5–10 minutes	Alive
2	35	Male	Bachelor's degree	Sports coach	Y	6–12 months	1–2 years	10–20 minutes	Alive
3	28	Male	At least master's degree	High school teacher	N	Within 1 week	1–2 years	Over 20 minutes	Alive
4	37	Male	At least master's degree	Military training instructor	Y	1–2 years	1–2 years	10–20 minutes	Alive
5	35	Female	At least master's degree	Staff of the train station	N	More than 5 years	1–2 years	10–20 minutes	Alive
6	29	Female	Bachelor's degree	Sports coach	N	2–5 years	0–1 year	10–20 minutes	Alive
7	34	Male	Bachelor's degree	Sports coach	N	6–12 months	0–1 year	Within 5 minutes	Alive
8	34	Male	At least master's degree	Administrative clerk	N	1–2 years	0–1 year	Within 5 minutes	Alive
9	40	Female	Bachelor's degree	Nurse in the health center of a university	Y	0–6 months	0–1 year	Within 5 minutes	Alive

OHCA: out-of-hospital cardiac arrest.

Table 2. Motivation

Category	Subcategory
A. Helping trait	A1. Professional knowledge and skills:
	Prior to longer duration of training
	A2. Characteristics of altruistic behaviors:
	Calm
	Confident
	A3. Altruistic tendency:
	Learning from families and friends
B. Individual cognition	B1. Failure in recognizing the need for help:
	Lack of confidence
	Checking consciousness repeatedly and preventing immediate decision
	B2. Concern regarding harming the patient:
	Rib fracture
	Causing death
	Making more problems
	B3. Fear of infectious diseases:
	Feeling nausea and cleaning mouth after resuscitation
	B4. Fear of legal liability:
	Illiteracy on legal liability
	Possibility of being sued by a patient's family
C. Situation awareness	C1. Personal situation awareness of the emergency event:
	Interpretation upon the emergency event based on personal past experiences
	C2. Situation awareness triggered by others:
	Enhanced resuscitation process because of effective instructions from other lay rescuers
	C3. Influence from bystander effect and teamwork:
	Bystander effect and responsibility diffusion
	Teamwork resuscitation

was not sure enough,……we spent about 2 minutes checking the victim's pulse and breaths." (No. 4)

The lay rescuers compressed the chest of the victim, but they did not get feedback, something like in the training course, about compression depth. Therefore, they worried about harming the victim either by causing rib fracture, causing death, or making their conditions worse.

"I worried about rib fracture of the victim." (No. 5)

"No doubt, most of the people worried about it. I helped him [victim] today, but I did not perform well enough. If the victim had died after few hours or few days, is that my fault?" (No. 7)

"I was allowed to rescue him [victim],……but I was not a professional. I was afraid of causing more problems." (No. 8)

During the resuscitation, they felt neither inappropriate nor nauseated while performing mouth-to-mouth ventilation. However, after the event, they began to worry about contracting infectious diseases through ventilation. One lay rescuer stated,

"I became nauseated very much. The victim's vomits contained a little blood." (No. 3)

Another lay rescuer provided a similar response.

"When we arrived at the hospital, I cleaned my mouth in the washroom because he was a stranger. Cleaning the mouth is a necessary behavior." (No. 1)

Most of the lay rescuers do not understand the current legal obligation. They were fearful of the criticism from the victim's family. One lay rescuer stated,

> *"Even if I had knowledge, talent, and skill of dealing with such events, I worried…… after I rescued you,……I was accused and reparation was requested."* (No. 8)

Situation Awareness

The situation awareness of lay rescuers themselves and other bystanders influenced the lay rescuers' behavior. One of the lay rescuers said,

> *"The standard operating procedures had appeared in my mind……I felt calm……and then I completed it."* (No. 1)

Most lay rescuers replied about the same thought. Moreover, the lay rescuers checked the pulse of the victim again, and wanted to be instructed or supported by other people. When the lay rescuers received and accepted the instruction, they could spend a long time assessing and rescuing the victim.

> *"One person told me that I ought to compress the chest continuously……I had the courage to keep chest compressions."* (No. 5)

If there were many persons and professionals at the scene, the lay rescuers felt supported and their responsibility lessened, even though other people did not do anything. One lay rescuer stated,

> *"When the event occurred, my colleague was here,……even if they did not do anything,……they supported me,……and I felt I did not need to take all the responsibilities."* (No. 2)

However, negative thoughts also occurred.

> *"They just stood aside without doing anything. They just stood and watched……No one asked if they could do something.…… They were selfish."* (No. 6)

The lay rescuers hoped that other people could help them in the event as teamwork. This could reduce the pressure when they performed resuscitation. Additionally, they thought teamwork could make the resuscitating course better.

Training-Reality Discrepancies

Rescuers reported certain discrepancies about the reality, their training experiences, and imaginations about resuscitating events (Table 3). They also reported that regular updates of CPR knowledge and skills were helpful in their future CPR attempts.

Behaviors and Performance

Some lay rescuers felt that it was different compressing the mannequin compared to a real person, and it was difficult to control the strength to achieve optimal chest compression depth.

> *"It was difficult to control my strength."* (No. 4)

However, a lay rescuer felt that resuscitation skills were similar during actual resuscitation and training courses.

> *"The skills of chest compression on the victim were the same [when compared with compression on a mannequin's chest]."* (No. 8)

Other Factors and Performance

Many interfering factors may affect lay rescuers' performance in a real-life situation. The events were always full of challenges, and the lay rescuers needed to manage these things, which did not exist during the training course. One lay rescuer stated,

Table 3. Training-reality discrepancy

Category	Subcategory
A. Training-reality discrepancy	A1. Behaviors and performance: Difficulty in determining the depth of chest compression
	A2. Other factors and performance: Performance affected due to other uncertainty in reality

"I knew I should perform CPR step by step,……but I felt tempted to repeatedly check the patient's consciousness and breathing in reality." (No. 4)

However, another lay rescuer stated,

"When I compressed the chest for the victim, the clothes were under his head,……but it was not a serious interference and I ignored it when I rescued the victim." (No. 1)

Psychological Influence

From the lay rescuers' reflection about the event, it was concluded that it involved mental strengthening, including a feeling of more responsibility and confidence than before. The event was a positive experience for the lay rescuers, and they said they would be willing to help another victim in the future (Table 4).

Influence and Development

Personal behavior is affected by both internal attribution (e.g., personality and attitude) and external attribution (e.g., situation). For lay rescuers, the survival of the victim is one of the important factors that ensure their willingness to rescue another victim again.

"The victim survived……I feel happy.……I will try again next time." (No. 5)

Successful experiences increase their confidence.

"The outcome of the victim is good,…… I feel I am more confident [to rescue other people]." (No. 2)

After the event, the lay rescuers had flashbacks and avoided scene stimuli.

"When I shared the experience, I had a flashback of the scenes,……it was terrible." (No. 3)

Images of the victim's face returned, and they worried or were terrified about it. After the event, a few lay rescuers avoided talking about the event. One lay rescuer stated,

"I did not want to work,……it was a little terrible,……I left the site soon." (No. 6)

When the lay rescuers shared their experiences after the event, the negative influence was reduced if they received positive feedback from others.

"I told my family about the whole resuscitation course,……they said they were proud of me." (No. 7)

"The more people I share with the resuscitation experience, the less I feel the impact of the event." (No. 6)

Through the event, the lay rescuers and their families realized the importance of bystander CPR and AED.

Table 4. Psychological influence

Category	Subcategory
A. Influence and development	A1. Victim outcome:
	When a patient survived, willing rescue attempts in the future
	A2. Connection to the emergency event:
	Flashback
	Avoidance of situational stimuli
	A3. Sharing, reflection, and personal development:
	Sharing the experience with others
	Individual development from the experience
B. Experiential learning	B1. Observational learning:
	Prior experience as an observer in OHCA cases
	B2. Learning experiences shared by professionals:
	Sharing the experience and concept from professional providers after resuscitation

OHCA: out-of-hospital cardiac arrest.

"After the event, I believed that I took these resuscitation skills more seriously than other people." (No. 2)

All lay rescuers reported that they became restless for some time after the event. Nevertheless, they felt the event did not leave a shadow in their lives, especially since they heard that the patients survived.

Experiential Learning

From these events, the lay rescuers learned the valuable experience, and they felt they would spend a shorter time assessing the victim with cardiac arrest next time. One lay rescuer stated,

"I believe I can make a quicker decision to start CPR next time." (No. 4)

It is useful that medical personnel share their experience and concept with the lay rescuers and inspire them immediately.

"I was confused about the resuscitation steps……[After the event,] I asked the professional provider the questions,……'what to do better under that circumstance?' and [then I asked] another question, ……I understood the resuscitation skills." (No. 2)

Discussion

To our knowledge, this is the first paper looking at lay rescuers' experiences from Asian communities. Bystander-initiated CPR and AED are pivotal in the community chain of survival, but little is known regarding why scene rescuers are motivated to offer help. Additionally, the gaps between what they had been told and what they experienced, and the impact from the incidents, especially among Asian communities had not been fully explored. We interviewed nine lay rescuers from Taiwan Public AED Registry, and found that the lay rescuers possessed helping traits and high motivation, had experienced certain training-reality discrepancies, and had been psychologically influenced by the events. This study provided important evidence for improving CPR training in the future and for building up systems to support lay rescuers in performing CPR.

According to previous studies, lay rescuers who performed bystander CPR usually have features such as responsibility,[26,27] positive traits or experiences,[14,27] including calm,[26,27] confidence,[27] and knowledge.[26,27] In our study, some participants had similar altruistic traits, such as calm and confidence. It seems that there is no difference in altruistic traits in both the Western and Eastern countries. Additionally, such altruistic traits were reported to be attributed to previous professional experiences, personality, and previous competency in CPR skills. Our study suggests that altruistic traits may be developed by training learners to acquire a positive attitude, effective knowledge, and skills through CPR courses. Besides, building up friendly legislation for laypeople to perform CPR, and disseminating such message during training courses may further improve the motivation of lay people to perform CPR. These were suggested by some of our participants who were afraid of legal liability. Some of the lay rescuers who lacked confidence sought physical help from others, such as resuscitating together, or just mental support while performing CPR. A particular phenomenon characterizing the relationship between bystander numbers and actual help offered, the so-called "bystander effect", has been studied and proposed.[27,28] The more bystanders that are present at the scene, the less likely the victim will be helped. In our study, however, the bystander effect was not evident, and it was speculated that the altruistic traits overcame such effect. Furthermore, the rescuers wished that more people took part in the resuscitation, working with them as a team. It is evident that creating an altruistic atmosphere in the community and immersing the citizens in it is paramount, because it inspires more people to be willing to help others. From our findings, it showed that, to increase the rates of bystander CPR, it is always needed to design more effective CPR courses to empower more learners performing CPR and to ease the barriers of performing CPR. Regular training, such as the high-frequency low-dose training concept,[29] may help potential rescuers to maintain CPR skills and be more confident to perform bystander CPR in public.

There are several discrepancies between training and actual situations identified by this study. Although the rescuers were willing to help the OHCA victims, they still spent a lot of time making sure if chest compression ought to be initiated. One study also reported that signs of cardiac arrest were often misinterpreted by lay rescuers and it delayed the time to start chest compression.[30] Additionally, the CPR performed on the mannequin is very different from that of a real

victim. Lay rescuers found that compression force and position were very different from what they learned during training. Moreover, interruptions from the unexpected situations at the scene of resuscitation might cause anxiety in lay rescuers. These did not occur during training, and often could spoil the resuscitation process. To alleviate the training-reality discrepancy, the content of training courses should not only include teaching about the CPR and AED skills, but also emphasize the signs of cardiac arrest, including agonal respirations and cyanosis. The learners should develop the ability to identify victims of cardiac arrest and commence CPR quickly. It is also helpful to introduce what might happen commonly during actual resuscitation in the training course with videos of actual events to relieve the anxiety and increase the confidence of rescuers when they deal with a similar condition in a real-world resuscitation scenario. Additionally, real-time feedback for CPR quality, such as AEDs with audio-feedback, may also facilitate CPR and mitigate the gap between training and actual situations.[31,32]

In our study, the lay rescuers reported some psychological stress following the event, such as flashbacks, anxiety, and fears about infectious diseases and lawsuits. Some studies also showed similar short-term and even long-term adverse psychological effects on lay rescuers after performing CPR.[21,22] One study reported that most lay rescuers strongly linked the quality of their CPR provision to the outcome.[22] They tried to find out the outcome of the cardiac arrest victim and felt sad when the outcome was bad. The psychological influence lasted even for several years.[22] Although all victims related to our study survived, and all the rescuers reported that knowing the good outcome of the victims reduced their psychological burden, one rescuer left her job after the event due to the psychological stress. This revealed that, although there were no obvious long-term negative psychological influences, the act of performing CPR really had some short-term impact on these rescuers. Debriefing of OHCA bystanders has been shown to positively influence their ability to cope with the emotional reactions, the cognitive perception of their performance, and the motivation to improve their CPR skills.[33] Our study had similar results because our participants also disclosed that sharing experiences with others reduced the psychological impact. Additionally, medical personnel consultation was helpful for the growth of their skills and confidence. Thus, a supportive program involving psychological and resuscitating professionals will be needed to ease the psychological effects and to provide the chance for experiential learning for the next resuscitation.

Limitations

This study has several limitations. First, the time of the interview was not close to the time of the event. Rescuers' feelings and psychological effects could have changed over time. However, it gives us a chance to see whether long-term psychological effects happened. Secondly, all the victims from the events enrolled in this study survived finally, and such information was known to the rescuers before the interview. This could have biased the results toward a more positive attitude. We were not able to evaluate the psychological influences of those who had a non-salvageable bystander CPR experience or who did not know the condition of the victims. Nevertheless, these rescuers still experienced negative psychological effects, and the results indicated that system support was still needed as a useful back-up for the implementation of bystander CPR.

Conclusions

In conclusion, this study provides valuable information on strategies to increase layperson CPR rates and CPR training effectiveness in Asian communities, especially in Taiwan. Measures should be taken to increase layperson's confidence and situation awareness, to reduce training-reality discrepancy, and to build up a support system to avoid negative psychological effects.

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None.

Authors' Contributions

Hsuan-Hua Chen and Wen-Chu Chiang contributed equally to the work.

Conflicts of Interest Statement

None.

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