

2020

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10.1111/1753-6405.12990

Rankin, T., Holmes, L., Vance, L., Crehan, T. and Mills, B. (2020), Recent high school graduates support mandatory cardiopulmonary resuscitation education in Australian high schools. *Australian and New Zealand Journal of Public Health*. <https://doi.org/10.1111/1753-6405.12990>

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# Recent high school graduates support mandatory cardiopulmonary resuscitation education in Australian high schools

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Out-of-hospital cardiac arrests (OHCA) pose a significant public health problem, with an estimated 24,373 cases throughout Australia in 2017 and a survival rate of 12%.<sup>1</sup> Cardiopulmonary resuscitation (CPR) is the prescribed intervention for cardiac arrest; survival rates from OHCA rely heavily on early CPR intervention.<sup>2,3</sup> Bystanders who witness an OHCA are in the best position to initiate early CPR,<sup>4</sup> and research shows that spontaneously administered bystander CPR provides the best survival rate in cases of witnessed OHCA.<sup>5</sup> However, CPR is spontaneously administered by bystanders in only 17.5–21.2% of witnessed OHCA cases.<sup>2,6</sup> Considering the large volume of OHCA, the percentage of bystanders spontaneously administering CPR is small. There have been many strategies employed to improve bystander CPR rates. Two of significant note include the use of dispatch-assisted CPR (DA-CPR) and increasing the number of CPR-trained people in the community.

During an emergency call, dispatchers can provide instructions over the phone on how to perform CPR<sup>7</sup>; this process is known as dispatch-assisted CPR (DA-CPR). Research has shown that on occasions where CPR is not spontaneously administered, as many as 70% of bystanders initiate CPR when under the instruction of a dispatcher.<sup>5</sup> This makes the DA-CPR an effective strategy for improving bystander CPR rates, especially in bystanders who are not CPR trained. However, research has shown better survival rates from freely administered CPR compared

## Abstract

**Objective:** To evaluate recent high school graduates' opinions on mandatory cardiopulmonary resuscitation (CPR) training in the high school curriculum as a solution to improving bystander CPR rates.

**Methods:** Participants completed questionnaires assessing their CPR training history during their high school education, their willingness to learn CPR during their high school years and their opinion on making CPR training mandatory for high school curricula.

**Results:** Of the 178 participants in this study, 60% had undertaken CPR training during their high school education. Of those who had not undertaken CPR training, 75% reported that they would have been willing to learn CPR had they been provided with the opportunity. A total of 97% of participants were in support of mandatory CPR training in high school education.

**Conclusion:** Implementing mandatory CPR training in high school education would be embraced by students.

**Implications for public health:** Findings of this study support our recommendation to implement mandatory CPR training in the high school curriculum. This will likely increase the number of bystanders in the community who would spontaneously administer CPR, thereby improving outcomes for patients experiencing out-of-hospital cardiac arrest.

**Key words:** cardiopulmonary resuscitation, CPR, mandatory CPR, CPR training

to DA-CPR,<sup>5</sup> suggesting a greater survival benefit to increasing the numbers of CPR-trained members out in the community. Not surprisingly, this benefit is largely attributed to the rapid initiation of freely administered CPR, in comparison to initiation of DA-CPR that occurs only after instruction from a dispatcher.

The most commonly cited barriers to performing CPR among those not specifically trained in emergency medicine include a lack of CPR training, fear of infection, and fear of legal liability.<sup>5,8–10</sup> Compression-only CPR has been encouraged to help overcome fears of infection associated with mouth-to-mouth contact with marginal success. Bobrow et

al.<sup>11</sup> reported a 4.1% higher incidence of compression-only CPR than traditional CPR (19.2% vs 15.1%). Dispatch-assisted CPR was also introduced to address the challenges to bystander provision of CPR.<sup>5</sup> While these methods are useful in addressing these barriers, the lag time between OHCA onset and CPR initiation associated with DA-CPR emphasises the need for solutions to improve the amount of CPR-trained members in the community.

CPR training has been shown to increase the number of individuals who are willing to perform CPR on a family member or stranger, improve confidence in their ability to perform CPR, reduce anxieties of a negative outcome

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Submitted: August 2019; Revision requested: February 2020; Accepted: March 2020

The authors have stated they have no conflict of interest.

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*Aust NZ J Public Health.* 2020; Online; doi: 10.1111/1753-6405.12990

or the risk of infection, and reduce fears of being held legally liable for a bad outcome.<sup>10</sup> Swor et al.<sup>6</sup> reported that CPR-trained bystanders were six times more likely to provide CPR than untrained bystanders in emergency medical situations. Given this, the merits of implementing mandatory CPR training among certain community groups in an attempt to increase the rates of spontaneous CPR administration are being considered.

One of the major strategies employed to improve bystander CPR is the enforcement of mandatory CPR training in the school curriculum.<sup>12</sup> Since the American Heart Association provided an advisory statement in 2011, an increasing number of states in the US have adopted mandatory CPR training in schooling education.<sup>12-14</sup> The mandatory training of high school students in CPR has also been adopted in Norway.<sup>8</sup> This strategy is particularly effective in reaching a large volume of people, given that students are required to remain in the education system until mid-teenage years in most countries. Furthermore, recent research has shown that physical education student teachers are equally as effective in teaching CPR as registered nurses, with nursing being one of the few professions allowed to provide CPR training in The Netherlands.<sup>15</sup> This suggests that high school educators, after undertaking appropriate training, are capable of providing appropriate CPR training to their students, making high school education a feasible target for CPR training.

While support and recognition of the value in training high school students in CPR is increasing internationally, there has been much discussion on the attitudes of high school students toward CPR training. A study of high school students in New Zealand, where first aid training during high school education is optional, found that 70% of students had undertaken some form of first aid training in the past.<sup>16</sup> Further to this, the majority of students in the study had a strong positive attitude toward CPR, which was not influenced by CPR training status. In Norway, where CPR training is mandatory, 86% of students supported the compulsory nature of basic life support training in school, with only 1% of the students believing it should be an optional activity.<sup>8</sup>

Mandatory CPR training is yet to be implemented in Australian high school education. A qualitative study among recent Australian high school graduates

demonstrated a strong positive attitude toward CPR training, as well as the concept of training being mandatorily implemented into high school curricula. While the sample size was low due to the qualitative nature of the investigation (n=28), the cost of CPR training was suggested to be one of the greater barriers toward undertaking the training of students own volition.<sup>9</sup> This would undoubtedly create disparities in the provision of CPR training between different ends of the socioeconomic spectrum. Mandatory CPR in high school education would work to overcome these barriers to both the learning and provision of bystander CPR in the community.

While there are undoubtedly many factors that would need to be considered prior to mandatory CPR being implemented into Australian secondary school curricula, the present study sought to focus on gauging the extent to which students would support or disapprove the concept of mandatory CPR training in high school. Should, as per previous qualitative investigations,<sup>9</sup> support for the concept be forthcoming, this could provide sufficient justification to remove the reasons of student dissatisfaction, criticism or lack of interest being used to argue against mandatory CPR training implementation in Australian high schools.

## Methods

Participants completed either a hard copy or online questionnaire. The 17-item questionnaire was composed of five demographic questions, five yes/no answer questions and seven questions on a 5-point Likert scale (some with open-ended response options asking for additional justification of their viewpoints) addressing factors associated with CPR provision and CPR training. Participants were required to: be fluent in English, reside in Australia, be aged 18–21 years, and to have graduated from an Australian high school. The decision was made to approach recent high school graduates as it was felt they would be better equipped to reflect on their entire high school career, as opposed to current students who had not yet graduated. Persons working or studying within a healthcare setting were deemed ineligible to take part in the study, as it is unlikely individuals with such backgrounds would provide a true representation of 'average' high school graduates' perceptions surrounding CPR

provision and training. Those who had undertaken some form of CPR training in the past, but who did not work or study in the healthcare sector, remained eligible to take part in the study.

Participants were recruited through social media, snowball sampling, or in lecture theatres in their undergraduate studies. Participants could forward an online invitation to the study to others through email or social media. An initial invitation letter was provided to prospective participants which included a link to the online survey. The first page of the questionnaire included an information letter detailing the study aims, benefits of participation, confidentiality, the participant's rights, and contact details for study investigators. Informed consent was provided by submission of the questionnaire.

Ethics was approved by the School of Medical and Health Sciences and School of Science Ethics Subcommittee at Edith Cowan University (#18103).

Statistics were analysed using IBM SPSS Statistics version 24.0.<sup>17</sup> Percentages were compiled of the various responses and a chi-square test was conducted to compare between groups. Continuity correction was applied where degrees of freedom (df)=1.

## Results

### Demographics

A total of 178 participants who met inclusion criteria completed the study; most participants (62.4%) completed a hard copy of the questionnaire. Of these participants, 70.2% were female, and all participants were from Western Australia. A breakdown of participants by age can be seen in Table 1.

### CPR training during high school

A total of 106 participants (59.6%) had undertaken CPR training during their high school years; gender ( $X^2=0.493$ ,  $df=1$ ,  $p=0.482$ ) and school type (public vs. private school;  $X^2=2.729$ ,  $df=1$ ,  $p=0.099$ ) did not influence the undertaking of CPR training during high school. Of those who had undertaken CPR training during high school, 90 participants (84.9%) reported that their school had organised for their training; this was not influenced by school type ( $X^2=1.151$ ,  $df=1$ ,  $p=0.283$ ).

Ninety-seven per cent of participants were of the view that all high school students should

be required to take CPR training as part of their curriculum; whether or not participants had undertaken CPR training during their high school years did not influence this view ( $X^2=0.243$ ,  $df=1$ ,  $p=0.622$ ). Fifty-four of the 72 participants (75.0%) who did not undergo CPR training during high school reported that they would have been willing to learn CPR if they had been provided with an opportunity by their school, while only seven (9.7%) stated that they would not have been interested in undertaking CPR training during their high school education if they had been provided with an opportunity. Eleven participants (15.3%) who did not undertake CPR training during high school did not complete this question.

### Effects of CPR training on high school students

A total of 82.0% of participants stated that they were likely to perform CPR on a family member, but only 65.5% suggested they would be comfortable doing so on a stranger (Table 2); while 84.8% of participants stated they were more likely to perform CPR on a family member and 77.5% on a stranger if they were to undertake additional CPR training. Responses did not change between individuals who had received CPR training during high school years compared to those who had not ( $X^2=1.863$ ,  $df=2$ ,  $p=0.394$ ;  $X^2=3.951$ ,  $df=2$ ,  $p=0.139$ , respectively).

### Barriers to CPR

Participants were asked whether their choice to administer CPR to either family or strangers would be impacted if they were concerned about: 1) inadequate CPR skills; 2) causing further harm to patients; 3) being held legally liable; or 4) risk of infection. There was no difference in responses observed between administering CPR on family vs. strangers, except for concern about legal liability (Table 3). Participants who had learnt CPR during high school were more likely to be concerned about being held legally liable when the patient was a stranger than those who did not learn CPR during high school.

### Discussion

There were an estimated 24,373 cases of out-of-hospital cardiac arrests throughout Australia in 2017 with most cases (88%) resulting in death.<sup>1</sup> The most effective treatment for cardiac arrest is CPR, and

Years of age	%
18	29.8
19	34.8
20	20.2
21	14.6

studies have shown that OHCA survival requires early administration of CPR.<sup>2</sup> Alongside a number of major interventional strategies that have been employed to improve bystander CPR provision, we note an international trend of implementing mandatory CPR education in high school curricula. While several countries have employed this strategy, Australia currently has no mandatory requirements in place. To help determine one aspect surrounding the feasibility of implementing such measures to improve bystander CPR rates in Australia, we investigated the attitudes of recent high school graduates toward mandatory CPR training in high school education.

Our investigation found that recent high school graduates were strongly supportive of introducing mandatory CPR training in high school education. This is consistent with a qualitative study of recent high school graduates in Western Australia,<sup>9</sup> and also mirrors the reception found in secondary school students in Norway, a country that already has mandatory CPR training in its high school curriculum.<sup>8</sup> Our data suggests not only that there would be little-to-no resistance from high school students in implementing mandatory CPR training in their high school education, but also that most students would welcome the concept. Another significant benefit to implementing mandatory CPR training is addressing socioeconomic bias in CPR training provision, given that cost has been identified as one of the limiting factors of accessing CPR training.<sup>9</sup>

Table 3: Percentage of participants that identified concern for different aspects should they administer CPR on either family or stranger. CPR+ = participants that undertook CPR training during their high school education; CPR- = participants that did not undertake CPR training in high school.

Area of Concern	Family				Stranger			
	CPR+ (%)	CPR- (%)	( $X^2$ )	p	CPR+ (%)	CPR- (%)	( $X^2$ )	p
Inadequate skills	67.9	65.3	0.042	0.837	57.5	58.3	0.000	1.000
Cause further harm	67.0	76.4	1.408	0.235	57.5	69.4	2.104	0.147
Legally liable	26.4	31.9	0.399	0.527	74.5	59.7	3.699	0.054*
Risk of infection	15.1	5.6	3.014	0.083	44.3	31.9	2.266	0.132

Note:  
Continuity correction on all values.  $df=1$

Several studies of high school students and recent high school graduates found that common barriers to CPR provision include a lack of CPR training, fear of causing further harm, fear of legal liability and fear of communicable diseases.<sup>8-10</sup> Our study corroborated these findings; however, we did not find any significant differences between students who had undertaken CPR training during their high school years compared to those who had not, with the exception of the fear of being held legally liable for their actions. Given that previous research found CPR training reduces anxiety surrounding legal reprisal due to negative health outcomes,<sup>10</sup> it remains unclear why participants in our study who had undertaken CPR training during their high school years were more likely to be fearful of legal liability when the patient was a stranger compared to those without such training. Nevertheless, this finding suggests that CPR training may be working counterproductively to increase fear of legal reprisal and warrants further investigation and action.

### Limitations

Our study is not without limitations. Previous studies have shown that individuals with higher self-perceived knowledge of CPR were more willing to perform CPR.<sup>18</sup> It was outside the scope of this study to assess self-perceived knowledge of CPR and it therefore may be likely that differences in CPR knowledge/skill retention may be a better indicator of willingness to perform CPR than previously undertaking CPR training alone. To this end, we also did not evaluate

Table 2: Percentage of participants that were willing to perform CPR on a family and stranger.

	Family	Stranger
Would give CPR	82.0%	65.5%
Would give CPR if more training	84.8%	77.5%

the time that had elapsed since participants had undertaken CPR training (among those who had undertaken training); this may also mediate retention of knowledge.

## Conclusions

These limitations notwithstanding, our sample was clearly supportive of the concept of mandatory CPR training implementation in high school education. This makes mandatory CPR training in high school education a feasible solution to improving the proportion of members out in the community with CPR training. These results align with those of previous research. Such training is not mandatory in Australian high school education, and with the success of such models in other countries, it is therefore a method that would be likely to improve bystander CPR rates in Australia. Interestingly, our study found that CPR training may be working counterproductively in increasing the fear of legal liability from strangers. The aetiology of this fear is unclear and it requires further research to determine if this phenomenon is specific to the age group of our participants, or is also experienced in older populations.

## Acknowledgements

The authors would like to acknowledge Mr Mark Bourne, Mr Joshua Farthing, Mrs Emma Samuels, Ms Tyler-Jane Carey, Ms Tiana Busacca and Miss Jennifer Connors for aid in data collection for this study.

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