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FACTORS INFLUENCING PERCEIVED CPR HANDS-ONLY SKILL RETENTION AMONG HIGH SCHOOL STUDENTS

Gilny Aileen Joan Rantung[1]✉, Atsede Aregay[2]
[1]Faculty of Nursing, Universitas Advent Indonesia, Indonesia
[2]Health and Nursing Sciences, University of Agder, Norway

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ABSTRACT

Retention refers to an individual's ability to retain or recall information, knowledge, or skills acquired through learning. Proficiency in performing Cardiopulmonary Resuscitation (CPR) is essential for high school students to enhance their preparedness for emergencies. One of the most straightforward CPR techniques for laypersons is CPR Hands-Only. This study aims to identify the factors influencing the post-training self-assessed perceived retention of CPR skills among high school students. A cross-sectional approach was employed, involving 111 high school students participating in a CPR Hands-Only training program. Participants were selected using a purposive sampling technique. Data were collected using structured self-assessment questionnaires to evaluate age, gender, class level, history of witnessing heart attacks, prior CPR training, knowledge, confidence, and perceived skill retention. Multivariate logistic regression was used for data analysis. Class level, knowledge, and confidence are found to influence CPR skill retention ($p<0.05$) significantly. 76.6% of participants have reported perceiving themselves as capable of retaining CPR skills, with most demonstrating moderate to high levels of knowledge and confidence. Age and gender do not have a significant impact, and prior exposure to heart attacks or CPR training also shows no notable effect on skill retention. The findings indicate that educational level, knowledge enhancement, and confidence-building are critical factors for successful CPR skill retention. Adapting training methods to these factors can improve training effectiveness and emergency preparedness, particularly in regions like Indonesia, where CPR training is not yet routinely integrated into school programs.

Kata Kunci:

Remaja;
Resusitasi Jantung Paru;
Pengetahuan;
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ABSTRAK

Retensi adalah kemampuan seseorang untuk mempertahankan atau mengingat kembali informasi, pengetahuan, atau keterampilan yang telah dipelajari. Kemahiran melakukan Resusitasi Jantung Paru (RJP) perlu dimiliki oleh siswa sekolah menengah untuk meningkatkan kesiapan mereka menghadapi situasi darurat. Salah satu teknik RJP sederhana untuk kaum awam adalah dengan metode *CPR Hands-Only*. Tujuan penelitian yaitu mengidentifikasi faktor-faktor yang memengaruhi persepsi retensi keterampilan CPR yang dinilai sendiri oleh siswa sekolah menengah setelah mengikuti pelatihan. Pendekatan Cross-Sectional dilakukan dengan melibatkan 111 siswa dari sekolah menengah atas yang telah mengikuti program pelatihan *CPR Hands-Only*. Partisipan dipilih dengan menggunakan teknik *purposive sampling*. Data dikumpulkan menggunakan kuesioner *self-assessment* terstruktur untuk mengidentifikasi faktor-faktor seperti usia, jenis kelamin, tingkatan kelas, riwayat melihat serangan jantung, pelatihan RJP sebelumnya, pengetahuan, kepercayaan diri, dan persepsi retensi keterampilan. Analisis dilakukan dengan menggunakan regresi logistik. Hasil penelitian menunjukan tingkat kelas, pengetahuan, dan kepercayaan diri secara signifikan memengaruhi retensi keterampilan RJP ($p<0.05$). Sebanyak 76,6% peserta melaporkan bahwa mereka merasa mampu mempertahankan keterampilan RJP, dengan mayoritas menunjukkan tingkat pengetahuan dan kepercayaan diri yang sedang hingga tinggi. Usia dan jenis kelamin tidak memiliki pengaruh signifikan, sementara paparan sebelumnya terhadap serangan jantung dan pelatihan RJP sebelumnya juga tidak menunjukkan dampak signifikan terhadap retensi keterampilan. Kesimpulan penelitian menunjukkan bahwa tingkat pendidikan, peningkatan pengetahuan, dan pengembangan kepercayaan diri adalah faktor kunci dalam keberhasilan retensi keterampilan RJP. Penyesuaian metode pelatihan sesuai faktor-faktor ini dapat meningkatkan efektivitas pelatihan dan kesiapsiagaan darurat. Studi ini memberikan panduan penting untuk pengembangan kurikulum pelatihan RJP, terutama di wilayah seperti Indonesia, di mana pelatihan RJP belum menjadi bagian rutin dalam program sekolah.

✉ ***Corresponding Author:***

Gilny Aileen Joan Rantung
Telp. +62 (022) 22700163
Email: gilnyaileen@unai.edu

INTRODUCTION

Cardiopulmonary resuscitation (CPR) is a vital life-saving skill that significantly improves survival rates in cases of cardiac arrest. Globally, CPR training is increasingly integrated into secondary school curricula as part of public health initiatives. Nurses play a pivotal role in advocating for and facilitating such training programs, which prepare students not only for emergencies but also instill a sense of responsibility and readiness to act in life-threatening situations (Nordheim, 2019; Salvatierra et al., 2017; Wilks & Pendergast, 2017).

Hands-only CPR, which involves chest compressions without mouth-to-mouth resuscitation, is particularly suitable for high school students. Its simplicity and effectiveness make it an ideal method for individuals without extensive medical training (Barsom et al., 2020; Magid et al., 2018). Research has shown that equipping adolescents with practical emergency response skills, such as hands-only CPR, significantly increases bystander intervention rates and improves survival outcomes in cardiac emergencies. Consequently, several countries have mandated CPR training in schools as part of their public health strategies (Nordheim, 2019).

In Indonesia, however, CPR training for high school students, including hands-only CPR, is not yet routinely implemented within the educational curriculum (Sutono & Achmad, 2020). This gap is particularly concerning given that CVD is the leading cause of mortality in the country, with deaths rising by 126% between 1990 and 2019 (Muharram et al., 2024). In West Java, including West Bandung, CVD rates mirror national trends, contributing significantly to mortality and morbidity (Muharram et al., 2024). Despite this burden, health education in Indonesian schools tends to focus on topics like reproductive health and drug prevention, leaving critical life-saving skills such as CPR largely unaddressed. This absence limits students' preparedness to respond effectively in emergencies, highlighting the need for structured CPR training programs in schools (Achmad, 2020; Ruing et al., 2023).

The effectiveness of such training programs, however, depends not only on their availability but also on the factors influencing students' ability to retain CPR skills over time. Retention of skills, including CPR, is influenced by various individual and contextual factors. Previous research provides a theoretical foundation for understanding how age, gender, educational level, prior experiences, knowledge, and confidence influence learning outcomes and perceived retention. Age is hypothesized to influence the perceived retention of CPR skills. Developmental theories suggest that cognitive and physical growth during adolescence enhances the ability to comprehend and execute complex skills (Mpotos & Iserbyt, 2017; Nebsbjerg et al., 2018; Papalexopoulou et al., 2014). Younger students may face challenges in performing CPR effectively due to physical limitations, whereas older students, who are cognitively and physically more mature, are expected to demonstrate higher retention levels.

Gender differences in learning styles and emotional attentiveness may also impact perceived skill retention (Dong et al., 2023). Research suggests that females may engage more deeply with training, potentially leading to better retention, while gender-segregated environments might further enhance skill acquisition (Sopka et al., 2013). Educational progression, particularly class level, is another factor hypothesized to influence CPR skill retention. As students advance in their education, they gain cognitive maturity and preparedness, which may positively affect retention (Chamdawala et al., 2021; Nord, 2017; Watanabe et al., 2017). Older students are expected to retain CPR skills more effectively due to their advanced understanding and receptiveness to training (Rankin et al., 2020; Unnikrishnan & Stanly, 2022).

Experiences with medical emergencies, such as witnessing heart attack incidents, are believed to play a motivational role in reinforcing the importance of CPR skills and enhancing retention. Theories of experiential learning suggest that real-life exposure to emergencies fosters deeper understanding and improved retention. This motivational factor may be particularly relevant for students exposed to such incidents. Previous CPR training is expected to have a positive influence on perceived retention. Studies show that regular retraining enhances both knowledge and confidence, ensuring skill retention over time (Kardong-Edgren et al., 2020; Saad et al., 2019; Watanabe et al., 2017). Repeated exposure to CPR training reinforces skills and builds a stronger foundation for retention.

Family medical history, especially regarding heart conditions, may also influence students' perception of the importance of CPR training, potentially enhancing retention. Students with a family history of cardiac conditions may perceive CPR skills as more personally relevant, which could strengthen their motivation to retain these skills (Cartledge et al., 2018; Lavie et al., 2016). Knowledge has consistently been identified as a critical predictor of CPR skill retention. A strong theoretical understanding supports the ability to recall and apply CPR techniques (Legoux et al., 2021; Papalexopoulou et al., 2014; Zenani et al., 2022). Students with higher levels of knowledge are more likely to retain these lifesaving skills effectively. Finally, confidence is hypothesized to play a pivotal role in skill retention. Confidence, often developed through simulation training and regular practice, directly influences a student's willingness and ability to apply CPR skills in real-life situations (Barsom et al., 2020; Mather & McCarthy, 2021). Enhanced confidence is therefore considered essential for improving retention and practical application of CPR techniques.

This study has investigated the influence of these factors on students' self-assessed perceived retention of CPR skills following hands-only CPR training. By identifying these influences, this research hopefully contributes to the development of tailored CPR training programs that address the unique needs of Indonesian high school students.

METHOD

Type of Research

A cross-sectional study was conducted in a public high school in Bandung Barat, Indonesia, in accordance with the STROBE guidelines for reporting cross-sectional studies. The focus is on assessing the factors influencing the retention of hands-only skills in CPR among high school students. The setting offered a direct context for evaluating the research objectives in an environment where CPR training is relevant and critical.

The study aims to investigate the influence of several factors on the perceived retention of CPR skills among high school students. These factors are age, gender, class level, history of witnessing heart attack incidents, prior CPR hands-only training, knowledge, and confidence. Specifically, the study has tested the following hypotheses:

H1: Age influences the perceived retention of CPR hands-only skills among Indonesian high school students.

H2: Gender influences the perceived retention of CPR hands-only skills among Indonesian high school students.

H3: Class level influences the perceived retention of hands-only skills in CPR among Indonesian high school students.

H4: Previous exposure to heart attack incidents influences the perceived retention of CPR hands-only skills among Indonesian high school students.

H5: Prior CPR hands-only training influences the perceived retention of CPR hands-only skills among Indonesian high school students.

H6: Knowledge influences the perceived retention of hands-only skills in CPR among Indonesian high school students.

H7: Confidence influences the perceived retention of CPR hands-only skills among Indonesian high school students.

Place and Time of Research

The research was conducted at a public high school in Bandung Barat, Indonesia. The study focused on participants in a CPR hands-only training program held on December 4th and 5th, 2023. Participants were recruited a week before the training, and data collection was conducted immediately following the program.

Population and Sample

The study included 111 students from Grades 10 and 11. The sample size was determined based on statistical power and feasibility considerations. Participants were chosen using a purposive sampling method, ensuring that only those who met the study's specific inclusion criteria were included. Participants were chosen based on their enrolment and completion of a hands-only CPR training program conducted as part of the research. This training program was opened to all students in Grades 10 and 11, and recruitment was carried out through an announcement at the school one week before the training. Participants were eligible if they were students in Grades 10 and 11 of the selected high school in Bandung Barat. They had voluntarily registered for and completed the two-day hands-only CPR training program conducted as part of the study and were present during the post-training data collection. Students were excluded if they did not attend the full training program, were absent during the data collection period, or failed to provide informed consent from their parents or guardians along with their assent.

Data Collection

Data were collected using a structured questionnaire designed on a Likert scale, administered to students after participating in a hands-only CPR training session. This session included instructor guidance, hands-on practice, and real-time feedback, integral for effective skill acquisition and confidence building. The 25-item questionnaire assessed demographics, history of witnessing heart attacks, prior CPR training, CPR knowledge (10 items), confidence (8 items), and skill retention perceptions (7 items). The primary objective of the data collection was to identify the factors influencing the post-training self-assessed perceived retention of CPR skills among high school students. This involved analysing the influence of age, gender, class level, history of witnessing heart attack incidents, prior CPR hands-only training, knowledge, and confidence on the perceived retention of CPR hands-only skills. Subject matter experts reviewed and refined the questionnaire to ensure its validity. The reliability of the instrument was established with a Cronbach's alpha of 0.818 for the CPR-related items, indicating a high level of internal consistency and reliability.

Data Analysis and Processing

In this study, logistic regression analysis using SPSS 26 investigated how various independent variables affected CPR hands-only skill retention. Age, knowledge, and confidence levels were analyzed as continuous and categorical variables based on their relevance and distribution, while gender, class level, heart attack exposure, and previous CPR training were included as binary or nominal variables. The binary logistic regression model was chosen due to the dichotomous nature of the dependent variable (high vs. low retention), allowing for an analysis of both continuous and categorical predictors. The study's design and data collection methods were structured to minimize potential sources of bias.

To ensure the robustness of our findings, the model's fit was assessed using the Hosmer and Lemeshow test, with a resulting p-value of .279 indicating a good fit. The model's explanatory power was evaluated using the Cox & Snell R Square (.310) and Nagelkerke R Square (.467), which suggested that a significant portion of the variance in CPR skill retention was explained by the predictors in the model. Additionally, subgroup analyses and interactions were examined to understand different impacts across demographics, and missing data were addressed using standard imputation methods. This comprehensive approach ensured a thorough examination of the factors influencing CPR skill retention among high school students.

Ethical Considerations

Ethical approval was obtained from the Indonesian Research Ethics and Health Development Committee (Approval Number 350/KEPK-FIK.UNAI/EC/XI/23). This study was conducted with strict

adherence to ethical standards, ensuring the protection of participant rights and well-being. Informed consent was obtained from each participant, with a clear explanation of the study's purpose, procedures, and their right to withdraw at any time. Participant confidentiality and anonymity were rigorously maintained, with personal identifiers removed or altered in all study documents and data securely stored with restricted access.

RESULT

In this study, the factors influencing the retention of CPR hands-on skills among high school students in Bandung Barat, Indonesia, have been investigated. The analysis has included an examination of both demographic characteristics and specific CPR-related variables, as well as a comprehensive evaluation of various predictors using multivariate logistic regression.

The study involves 111 Indonesian high school students, with a small number of participants (n=2) having missing data for certain variables of interest (age and previous CPR training). Despite this, the demographic profile presented in Table 1 reflects a diverse group. The largest age group is 16 years old, making up 55.0% of the participants, a critical age for developing skills like CPR.

Notably, the gender distribution is predominantly female, with females constituting 82.9% of the sample. This significant lean towards female participants reflects gender dynamics in educational settings and may also indicate a greater interest or participation rate among female students in CPR training programs. This observation warrants further exploration into gender-specific motivations and learning styles in CPR education.

Table 1. Demographic profile and CPR-related characteristics of high school students

Characteristic	Total N=111 (%)
Age	
15 years	16 (14.4)
16 years	61 (55.0)
17 years	34 (30.6)
Gender	
Male	19 (17.1)
Female	92 (82.9)
Class Level	
Grade 10	60 (54.1)
Grade 11	51 (45.9)
Witnessed a Heart Attack	
Yes	6 (5.4)
No	105 (94.6)
Previous CPR Training	
Yes	8 (7.2)
No	103 (92.8)
Knowledge Level	
Low	10 (9)
Moderate	69 (62.2)
High	32 (28.8)
Confidence Level	
Low	30 (27)
Moderate	68 (61.3)
High	13 (11.7)
Retention of CPR Skills	
Low	26 (23.4)
High	85 (76.6)

In terms of educational background, a slight majority (54.1%) of the students are in Grade 10. This distribution between Grades 10 and 11 provides an opportunity to examine how CPR skill retention might vary with educational progression within high school. Regarding exposure to real-life medical emergencies, only a small percentage (5.4%) of students have witnessed a heart attack, which may influence their perception of the immediacy and relevance of CPR skills. Prior experience with CPR training is also relatively low, with only 7.2% having undergone previous training. This underscores the potential impact of initial CPR training on knowledge and skill retention among high school students.

When considering CPR-related knowledge, a majority of students (62.2%) report moderate levels, while a notable proportion (28.8%) exhibit high knowledge. This variance in knowledge levels presents an opportunity to understand how knowledge impacts skill retention and confidence in performing CPR. Confidence levels varied among the participants, with most indicating moderate confidence (61.3%) in performing CPR. Understanding these confidence levels is crucial, as they likely influence the student's ability and willingness to apply CPR skills in real-life scenarios. Significantly, a substantial 76.6% of students demonstrate high retention of CPR skills, indicating the potential effectiveness of CPR training programs. This high rate of skill retention is a promising indicator of the impact of CPR education in high schools and its potential to equip students with lifesaving skills.

Based on these findings, further exploration has been conducted into how these and other factors collectively influence CPR skill retention. Multivariate logistic regression analysis has been employed to provide deeper insights into the complex interplay among these variables.

Multivariate Analysis of Predictor Variables and Retention

The logistic regression analysis, summarized in Table 2, has delved into how different factors impact CPR skill retention. The 'B (Coefficient)' represents the impact of each predictor variable on the likelihood of high CPR skill retention. A negative coefficient suggests a decrease, while a positive coefficient indicates an increase in this likelihood. The 'Sig. (P-value)' indicates the statistical significance of each predictor, with values less than 0.05 generally considered significant. The 'Exp(B) (Odds Ratio)' shows how much the odds of high CPR skill retention increase (if more than 1) or decrease (if less than 1) with a one-unit increase in the predictor.

Table 2. Logistic regression analysis of factors influencing CPR hands-only skill retention

Predictor Variables	B (Coefficient)	S.E. (Standard Error)	Wald	Sig. (P-value)	Exp(B) (Odds Ratio)	95% C.I. for EXP(B)
Age	-0.245	0.558	0.193	0.661	0.783	0.262 to 2.336
Gender	-1.394	0.994	1.965	0.161	0.248	0.035 to 1.741
Class Level	-1.779	0.812	4.797	0.029	0.169	0.034 to 0.829
Witnessed a Heart Attack	-18.465	16110.562	0.000	0.999	0.000	0.000 to -
Previous CPR Training	-1.335	1.196	1.245	0.264	0.263	0.025 to 2.744
Knowledge Level	2.873	0.832	11.916	0.001	17.683	3.461 to 90.344
Confidence Level	2.369	0.792	8.943	0.003	10.687	2.262 to 50.485

Age and gender do not significantly impact retention, as shown by their coefficients and non-significant p-values (Age: coefficient -0.245, p = 0.661; Gender: coefficient -1.394, p = 0.161). Class level is a significant factor, with a coefficient of -1.779 and a p-value of 0.029, indicating its substantial effect on retention. Other factors like witnessing a heart attack, previous CPR training, and family history of heart attacks do not show significant effects on retention. In contrast, knowledge (coefficient 2.873, p = 0.001) and confidence (coefficient 2.369, p = 0.003) are significant predictors, suggesting their strong correlation with improved retention of CPR skills.

This analysis highlights that while certain demographic factors like age and gender do not significantly influence CPR skill retention, educational factors, particularly class level, knowledge, and confidence, play a crucial role. These findings provide a foundational understanding of the key variables affecting CPR skill retention, which is discussed further in the following section.

DISCUSSION

This study, focusing on CPR hands-only skill retention among high school students in Bandung Barat, Indonesia, offers valuable contributions to the understanding of factors influencing skill retention. These insights hold significance in both local and broader contexts of CPR education.

Investigating the role of age in skill retention reveals that it is not a significant factor, which counters the initial hypothesis and suggests a more nuanced relationship between age and skill retention (Everett-Thomas et al., 2016; Halm & Crespo, 2018). This outcome contrasts with previous research advocating better retention among older individuals or those with higher education levels (Nebsbjerg et al., 2018; Papalexopoulou et al., 2014). Instead, it aligns with studies highlighting the efficacy of untrained younger individuals in performing dispatcher-directed CPR, thus questioning the impact of age (Beard et al., 2015). The absence of a direct correlation between younger age and skill retention, despite its association with longer CPR duration (Khan et al., 2014), underscores the complexity of this relationship and the necessity for further research to unravel age-related influences (Bingham et al., 2015).

The investigation then turns to gender as a potential influencer of skill retention. Contrary to the hypothesis, gender is found to have no significant effect. These findings challenge existing perceptions about the role of gender in skill retention and underscore the need for a reevaluation of gender-related aspects in CPR training. It also prompts further research to elucidate the lack of observed gender differences (Everett-Thomas et al., 2016; Papalexopoulou et al., 2014). While some studies support this finding by indicating negligible gender differences in skill retention (Kramer et al., 2015), others suggest gender-specific influences on CPR performance (Gegenfurtner, 2020), highlighting a gap that warrants additional exploration, especially in the context of women's representation in related training studies (Kambic & Lainscak, 2020).

The analysis subsequently has focused on the influence of class level, revealing significant effects on skill retention. Notably, Grade 10 students have different retention rates from Grade 11 students. This finding confirms the initial hypothesis and indicates the importance of considering educational stages in CPR training. The variance in retention rates may be attributed to cognitive and educational development differences, with older students exhibiting enhanced long-term skill retention. This aligns with studies suggesting that cognitive maturity positively impacts skill retention (Rankin et al., 2020; Unnikrishnan & Stanly, 2022).

Interestingly, while grade level significantly has influenced skill retention, age does not. This may be attributed to the narrow age range of participants, which limits variability and the ability to detect age-related effects. Grade level, however, represents more than chronological age, encompassing differences in educational exposure, cognitive development, and problem-solving experiences (Barsom et al., 2020; Halm & Crespo, 2018). These factors likely account for the higher retention observed among Grade 11 students. Older students in advanced grades also benefit from greater academic maturity, refined learning strategies, and stronger critical thinking abilities, all of which enhance skill retention (Chamdawala et al., 2021; Watanabe et al., 2017).

Another dimension explored is the impact of real-life experiences, such as witnessing a heart attack, on skill retention. Contrary to the hypothesis, witnessing a heart attack does not significantly influence skill retention. This finding challenges the expectations set by Kolb's experiential learning theory. It suggests that the emotional impact and complexities of processing traumatic events, particularly in adolescents, might overshadow the benefits of experiential learning in this context (Fraser et al., 2017). The emotional stress and cognitive demands associated with processing a traumatic event may potentially hinder the ability to consolidate and retain CPR skills effectively (Fraser et al., 2017).

Further examination has revealed that previous CPR training does not significantly affect long-term skill retention among high school students, diverging from the initial hypothesis. This outcome implies that factors beyond the frequency of initial training might influence retention. The need for refresher training to maintain skills is highlighted, despite the complex relationship between training

history, knowledge, self-efficacy, and CPR skill application (Lund-Kordahl et al., 2019). Nonetheless, the importance of incorporating first aid and CPR training into school curricula remains clear, with a focus on practical content and regular refreshers being crucial (Wilks & Pendergast, 2017).

The study also has considered the role of personal factors, such as family history of heart conditions, in skill retention. Surprisingly, it is found that a family history of heart attacks does not significantly influence CPR skill retention. This suggests that personal relevance, like a family history of heart conditions, may not be as motivating for learning and retaining CPR skills as previously thought. Despite existing research indicating increased engagement in CPR training among individuals with a direct connection to cardiac conditions (Cartledge et al., 2018; Lavie et al., 2016), and family health backgrounds influencing health education approaches (Notara et al., 2018), these factors do not necessarily translate into better skill retention in this study.

Attention is then turned to the foundational element of knowledge in CPR skill retention. Aligning with the hypothesis, knowledge emerges as a crucial predictor. This finding resonates with studies that identify a deeper understanding of CPR as key to effective retention and application (Legoux et al., 2021; Papalexopoulou et al., 2014). Evidence suggests that CPR training enhances knowledge and skill levels, thereby directly influencing retention (Zenani et al., 2022). The effectiveness of early and regular training in improving knowledge and practical skills is further highlighted, with studies showing that such training boosts competence and confidence (Alhareeri et al., 2023; Yeow et al., 2021). The success of comprehensive CPR courses in enhancing both theoretical and practical knowledge underscores the value of diverse training methods (Vargas-Sánchez et al., 2021).

Finally, the study emphasizes the significant role of confidence in influencing CPR skill retention. Confidence is identified as a key predictor, supporting the hypothesis that it extends beyond performance to influence retention. This aligns with the theory of self-efficacy (Bandura, 1997), suggesting that individuals with higher confidence are more effective in applying their CPR skills. The importance of fostering confidence in CPR training, particularly for high school students, is underlined. Additional research reinforces the direct connection between confidence and CPR proficiency (Lund-Kordahl et al., 2019). Methods such as simulation training and high-fidelity environments have been shown to significantly enhance confidence, thereby improving both immediate and long-term skill retention. The necessity of repeated practice and reinforcement in boosting confidence and skill retention is emphasized, highlighting the value of innovative, practical training approaches (Tivener & Gloe, 2015; Watanabe et al., 2017).

CONCLUSION AND SUGGESTION

This study sheds light on the factors affecting perceived CPR hands-only skill retention among high school students in Bandung Barat, Indonesia. Key findings reveal that class level, knowledge, and confidence are more critical than age and gender in influencing perceived CPR skill retention. The unexpected lack of impact from prior CPR training and witnessing heart attacks highlights the need for re-evaluating CPR training methods in schools. These findings hopefully provide a valuable guide for developing effective CPR training programs tailored to students' educational and psychological needs. By focusing on these key areas, CPR training can be optimized to ensure that students not only learn but also retain these life-saving skills.

Nurses, as key educators in health promotion and emergency care, are ideally positioned to lead strategically designed school-based CPR programs that prioritize building students' confidence and knowledge through regular, hands-on practice. By leveraging their expertise, nurses can ensure that training is both clinically accurate and educationally effective, ultimately enhancing long-term skill retention and improving community emergency response. Future research can adopt a mixed-methods approach with diverse populations, incorporating observational approaches to evaluate actual skill retention and performance over time. Longitudinal designs can be utilized to track retention trends while also considering socioeconomic factors and the inclusion of additional CPR techniques, such as Automated External Defibrillator (AED) use.

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