



FIRST AID TRAINING AT EARLY CHILDHOOD: A REVIEW OF LITERATURE

Eleana Tse¹ⁱ,
Katerina Plakitsi²,
Spyridon Voulgaris¹,
George A. Alexiou¹

¹Department of Neurosurgery,
University of Ioannina,
School of Medicine,
Greece

²Department of Early Childhood Education,
School of Education,
University of Ioannina,
Greece

Abstract:

By teaching first aid at school, the number of bystanders can be increased. Researchers are attempting to identify effective educational methods to teach first aid to children. The literature review examines published studies to provide information on the content of kindergarten first aid training. MEDLINE, Scopus, and ERIC were the major databases searched for related literature published between January 2003 and November 2022. The first aid interventions were varied in content and aimed to improve students' first aid knowledge, skills, and attitude. Combining both theoretical and 'hands-on' training components into the education process was discovered to be a critical factor in delivering material. More research is needed to determine the role of first aid education in kindergarten, as well as interventions for knowledge and skill retention.

Keywords: first aid, program, early childhood education, children

1. Introduction

Every day, severe and minor accidents occur all over the world. In many cases, it is critical to provide immediate first aid assistance. A quick response can mean the difference between life and death, or it can simply reduce the severity of an injury. Responders (namely bystanders) must have the necessary knowledge and skills in order to provide an immediate and efficient response in these cases. Nonetheless, many bystanders do not know how to react, owing to a lack of first aid knowledge, skills, and confidence (Cheng

ⁱ Correspondence: email e.tse@uoi.gr

et al., 2021). As a result, increasing the number of properly educated bystanders is a key challenge for improving the effectiveness of first aid (Eisenburger & Safar, 1999). The implementation of a first aid culture in society and the expansion of first aid educational channels are two options for addressing this challenge. Today, the primary channels of first aid education are primarily private and Red Cross, which can make education prohibitively expensive for those who cannot afford it. According to research, school can play a positive role in this direction (Kuvaki, 2018; Ammirati, 2014; Eisenburger & Safar, 1999).

By teaching first aid at school, the number of bystanders can be increased (Berthelot et al., 2013; Fleischhackl et al., 2009; Jones et al., 2007; Connolly et al., 2007; Frederick et al., 2000). Individuals who receive first aid education at a young age are more likely to retain this knowledge and skills as they grow older (Cheng et al., 2021; Kuvaki, 2018). Furthermore, children can be bystanders; thus, first aid education may improve their effectiveness in responding to accidents. For example, many accidents occur on the playground, during school breaks, and at home (Jaffe et al., 2021). Finally, schools can expand free first aid educational channels so that more people have access to first aid training. The International Scientific Community is conducting research on the education of children in first aid (Böttiger et al., 2017; Beck et al., 2016; Böttiger & Van Aken, 2015; Bohn et al., 2013). Evidence suggests that after receiving an appropriate education, children may be able to provide first aid (Perkins et al., 2021; Lukas et al., 2016; Cave et al., 2011). Their education includes both resuscitative and non-resuscitative programs; however, resuscitation is usually the primary focus of this education (Semeraro et al., 2018; He et al., 2014; Hill et al., 2009).

Researchers are attempting to identify effective educational methods based on children's age groups, teaching methodologies, and trainer characteristics (i.e., first aiders, doctors, or school teachers). Another area of interest is evaluating the effectiveness of educational programs using the following criteria: study design, program duration, facilitator, content, methods of outcome measurement, material, potential outcome, and limitations. The current paper examines six previously published studies on first aid training for young children at kindergarten in order to provide information about the focused areas and methods used in first aid education in accordance with the criteria mentioned above. More specifically, the purpose of this paper is to provide information on which criteria are at the center of current research and which criteria have been less addressed or ignored. Researchers can use the findings of this literature review to plan and conduct studies in specific areas, allowing them to optimize their research strategy for filling existing research gaps.

2. Material and methods

A thorough literature search was carried out in several relevant major databases, including MEDLINE, Scopus, and ERIC. We conducted a search using the keywords "first aid training OR first aid program." The search was carried out in December 2022. Based on the inclusion and exclusion criteria presented in Table 1, two independent researchers

(ET, GA) reviewed the obtained studies. Differences of opinion between the first two researchers were resolved by consensus. The inclusion criteria were met by a total of six peer-reviewed articles.

Table 1: Inclusion and exclusion criteria

Criteria	Inclusion	Exclusion
Language	English	Other languages
Children	4-6 years old	Over 7 years old
Type of articles	Original research	Review, Survey
Types of schools	Kindergarten, preschool	Primary school
Database	PubMed, Scopus, ERIC	Grey literature, another database

4. Results

The current literature review investigates first aid programs in early childhood education. We found only five studies. Bollig et al. (2011) collected data using a mixed-methods approach that included both quantitative and qualitative methods. It was a small pilot study with only ten kindergarten students. An observational cohort study was used in this study. The first aid course consisted of six lessons (30-40 minutes per week) taught by a first aid instructor and a kindergarten teacher. The teaching program's curriculum included basic first aid knowledge and cardiopulmonary resuscitation, which included mouth-to-mouth/mouth-to-nose breathing. Chest compressions and defibrillation were not included in the program. A poster and a glove puppet were important teaching tools. A test scenario was used to measure outcomes two months after the training intervention, and observation was used after seven months. When schoolchildren demonstrated first aid knowledge and skills in everyday situations, teachers take notes. According to the findings of the pilot study, 4-5-year-old children can learn and apply basic first aid. First aid courses could begin at this age, according to Bollig et al. (2011), even though their study had major limitations, such as a small number of participants and no control group to compare the outcomes.

Ammirati et al. (2014) performed their study by conducting a comparative study with trained and untrained students (N=285 students). The course had no set duration, and it was taught by a teacher. Before teaching first aid in the classroom, the teachers completed a six-hour first aid training program. The teaching program's curriculum consisted solely of calling an ambulance. There was no mention of teaching methods. They used photographs to evaluate the program two months after it was implemented. The images were unfamiliar to trained students and thus could not have been planned in time. Ammirati et al. (2014) discovered that trained students were better than the control group at describing an emergency and raising the alert. The authors suggested that first aid courses should be integrated into the school curriculum, beginning at the age of four, and taught by schoolteachers. Many biases favored the trained group in this study, such as a significant drop in untrained children from follow-up.

Banfai et al. (2018) used a longitudinal cohort study for their intervention. A paramedic provided the first aid course, which consisted of three 45-minute sessions per

week. Knowledge and skills were transferred in small groups (8-10 children per group). The teaching program's curriculum included calling an ambulance, basic life support (BLS), automated external defibrillator (AED), handling an unconscious patient, and managing severe bleeding. The authors used an open-ended questionnaire as well as observations to evaluate the program. The study was conducted before, immediately after, four, and fifteen months after the program. The findings revealed a significant improvement in knowledge, skills, attitudes, and information retention up to 15 months after the intervention. It was the only study that taught cardiopulmonary resuscitation (CPR) to children of these ages. They advised that, while young children cannot perform proper CPR, it is beneficial to learn some aspects of resuscitation because this knowledge is essential in the event of a true emergency. Because this study was conducted in only one kindergarten, there is no representative sample. Furthermore, it is unknown how preschool students would react in an actual emergency.

Plischewski et al. (2021) carried out an experiment. They assessed Norwegian kindergarten teachers' attitudes toward 'Henry first aid training,' as well as the impact on 3-6-year-olds' understanding of first aid. Henry is a first-aid program for young children that has been distributed for free to 5,200 kindergartens in Norway. The program included a puppet, a small first-aid kit, a memory stick containing three Henry songs, and a set of posters. The teaching program's curriculum included calling for assistance, recognizing an emergency, staying safe, and alerting adults. Henry is taught to the students by the teacher. Participants were chosen based on the fact that they had never used Henry in kindergarten. Researchers interviewed a small group of children, and follow-up interviews were conducted three months later. According to the findings of this study, children's understanding of first aid improved after participating in the program. There is no control group and no random assignment in this study.

Mohajervatan et al. (2020) conducted an observational study. Training consisted of ten sessions (45 minutes each) over five weeks, with two sessions per week transferring theoretical knowledge and scenario-based practical first aid skills. Experienced nurses instructed the first aid course. The curriculum of the teaching program included how to deal with an accident scene and knowing emergency phone numbers, airway management, assessment of the condition of consciousness, victim position recovery, control of nose bleeding, and control of hands or feet bleeding. The authors of this study created a questionnaire to assess each child's performance in a scenario through observation. The evaluation was carried out both before and three weeks after the training. They indicate that children can learn basic first aid skills such as calling an ambulance, handling an unconscious patient, and dealing with severe bleeding. This study lacked a representative sample, and the authors did not conduct long-term follow-up with the participants.

Tse et al. (2022) conducted a randomized controlled trial. Researchers randomly picked 24 children aged 4-5 years from one kindergarten and assigned them to one of two groups: training or control. There were three lessons in the training program. The children in the training group were given a questionnaire one day before, one day after, two and six months after the training, and once to those in the control group. Prior to the

training, there was no significant difference in the questionnaire scores between the two groups. The children in the training group outperformed the children in the control group on the questionnaire after the lessons. The scores of the children in the training group had decreased but remained higher than before the training and higher than those of the control group two and six months later. The study's limitations included the small sample size and the fact that the control group was not tested over time, so there could have been changes if they were all in the same school. Finally, because the survey was not validated, it may not be applicable to other kindergarten populations.

5. Discussion

The studies examined in this paper yielded interesting conclusions about the content of the interventions, the instructors (facilitators), and the study's limitations in terms of several methodological issues (e.g. sample, study design).

5.1 Content

The interventions had a mixed content. Studies have shown that both resuscitative and non-resuscitative programs can provide early childhood children with first aid training (Tse et al., 2022; Plischewski et al., 2021; Mohajervatan et al., 2020; Bánfai et al., 2018; Ammirati et al., 2014; Bollig et al., 2011). Furthermore, all of the studies reviewed included training on how to call an ambulance. The research was limited to teaching basic life support skills, and some programs included injury-related issues. It was discovered that incorporating both theoretical and 'hands-on' training components into the education process was an important factor in delivering material (Reveruzzi, Buckley & Sheehan, 2016). It is worth noting that one study investigated head injuries, despite the fact that the head is the most injured part of the body at this age (Jaffe et al., 2021). Furthermore, no study found that first aid training had a negative effect on students. Overall, the intervention content differed between studies (He, Wynn & Kendrick, 2014). As a result, it is impossible to say which type of training is more effective.

5.2 Educators

Studies had different facilitators to teach first aid to young children and it was indicated that both first aid instructors and teachers had positive outcomes on students' first aid knowledge, skills, and attitude. It is encouraging that the first aid instruction could be provided by teachers themselves in case they have the proper first aid education (Lukas et al., 2016). Teachers as facilitators may result in reduced cost, since it is a cost-effective method to increase the number of bystanders (i.e. no extra cost for external facilitators). However, no study assessed students' outcomes based on the type of facilitators. Hence, it cannot be concluded which type of educators may be more effective.

5.3 Limitations

There were several limitations in terms of population, study design, knowledge and skill retention, and comparison groups. Population limitations included small groups that

were not representative of the kindergarten population (Tse et al., 2022; Mohajervatan et al., 2020; Bánfai et al., 2018; Bollig et al., 2011). Four of the studies found no evidence of knowledge or skill retention. Ammirati et al. (2014) conducted an insufficient program information study. Bollig et al. (2011), Plischewski et al. (2021), and Mohajervatan et al. (2020) did not use a control group in their pilot study. The control group and follow-up rates differ significantly in the comparative study conducted by Ammirati et al. (2014). The studies by Banfai et al. (2018) and Tse et al. (2022) are the only ones that assessed students' prior first aid knowledge and skills. Finally, no study included a power analysis to ensure statistically significant results.

6. Conclusions

This article conducted a literature review that investigated first aid programs in early childhood education. Many researchers have concentrated on teaching older students first aid (Cheng et al, 2021; Tse & Alexiou, 2021; Tse et al., 2022; Tse et al., 2023). Children in early childhood education, on the other hand, can learn basic safety behavior, attitude, skills, and knowledge that will serve them well in adulthood (Tse & Alexiou, 2021). Even though the studies reviewed show that teaching first aid should begin at a young age, several research questions remain unanswered, including the time period for which first aid training knowledge is retained in children's memories, which instructor is more effective (first aid experts or teachers), when the program should be repeated, and whether the intervention program is actually effective in improving students' knowledge, skills, and attitudes toward first aid.

One more important aspect that must be carefully considered when investigating teaching first aid in early childhood is students' reactions in real-life first aid situations after participating in educational programs. As a result, there is a need to assess how the children would react in real-life scenarios and what aspects of training should be prioritized and intensified in order to improve students' effective reactions in real-life situations. As a result, research should concentrate on real-world scenarios to provide data that will aid in making early childhood first aid training more effective.

To summarize, the current study found that kindergarten first aid programs improve students' knowledge and skills. However, several aspects have not been investigated, making it impossible to produce scientific and robust results. Given the small number of studies that have been conducted in this research area, as well as the limitations discussed above, there is a need for additional research in this area.

Acknowledgements

Author Contributions: Conceptualization, GA and ET.; methodology, GA, ET, KP; formal analysis, GA, ET.; investigation, ET, GA.; data curation, GA, SV, ET, KP, writing—original draft preparation, ET, GA; writing—review and editing, ET, GA, SV, KP, supervision, GA. All authors have read and agreed to the published version of the manuscript.

Funding Statement

This research received no external funding

Conflicts of Interest Statement

The authors declare no conflict of interest.

About the Authors

Eleana Tse, PhD student, Department of Neurosurgery, School of Medicine, University of Ioannina, Greece.

Katerina Plakitsi, Professor, Department of Early Childhood Education, School of Education, University of Ioannina, Greece.

Spyridon Voulgaris, Professor, Department of Neurosurgery, School of Medicine, University of Ioannina, Greece.

George Alexiou, Associate Professor, Department of Neurosurgery, School of Medicine, University of Ioannina, Greece.

References

- Ammirati, C., Gagnayre, R., Amsallem, C., Némitz, B., & Gignon, M. (2014). Are schoolteachers able to teach first aid to children younger than 6 years? A comparative study. *BMJ Open*, 4(9).
- Bánfai, B., Pandur, A., Schiszler, B., Pék, E., Radnai, B., Bánfai-Csonka, H., & Betlehem, J. (2018). Little lifesavers: Can we start first aid education in kindergarten?—A longitudinal cohort study. *Health Education Journal*, 77(8), 1007-1017.
- Beck, S., Meier-Klages, V., Michaelis, M., Sehner, S., Harendza, S., Zöllner, C., & Kubitz, J. C. (2016). Teaching school children basic life support improves teaching and basic life support skills of medical students: a randomized, controlled trial. *Resuscitation*, 108, 1-7.
- Berthelot, S., Plourde, M., Bertrand, I., Bourassa, A., Couture, M. M., Berger-Pelletier, É., ... & Camden, S. (2013). Push hard, push fast: quasi-experimental study on the capacity of elementary schoolchildren to perform cardiopulmonary resuscitation. *Scandinavian journal of trauma, resuscitation, and emergency medicine*, 21(1), 1-8.
- Bohn, A., Van Aken, H., Lukas, R. P., Weber, T., & Breckwoldt, J. (2013). Schoolchildren as lifesavers in Europe—Training in cardiopulmonary resuscitation for children. *Best Practice & Research Clinical Anaesthesiology*, 27(3), 387-396.
- Bollig, G., Myklebust, A. G., & Østringen, K. (2011). Effects of first aid training in the kindergarten—a pilot study. *Scandinavian journal of trauma, resuscitation and emergency medicine*, 19(1), 1-7.
- Böttiger, B. W., & Van Aken, H. (2015). Kids save lives—: Training school children in cardiopulmonary resuscitation worldwide is now endorsed by the World Health Organization (WHO). *Resuscitation*, 94, A5-A7.

- Böttiger, B. W., Bossaert, L. L., Castrén, M., Cimpoesu, D., Georgiou, M., Greif, R., ... & Wingen, S. (2016). Kids Save Lives–ERC position statement on school children education in CPR: “Hands that help–Training children is training for life”. *Resuscitation*, 105, A1-A3.
- Böttiger, B. W., Semeraro, F., Altemeyer, K. H., Breckwoldt, J., Kreimeier, U., Rücker, G., ... & Wingen, S. (2017). KIDS SAVE LIVES: school children education in resuscitation for Europe and the world. *European Journal of Anaesthesiology EJA*, 34(12), 792-796.
- Cave, D. M., Aufderheide, T. P., Beeson, J., Ellison, A., Gregory, A., Hazinski, M. F., ... & Schexnayder, S. M. (2011). Importance and implementation of training in cardiopulmonary resuscitation and automated external defibrillation in schools: a science advisory from the American Heart Association. *Circulation*, 123(6), 691-706.
- Cheng, Y. H., Yeung, C. Y., Sharma, A., So, K. Y., Ko, H. F., Wong, K., ... & Lee, A. (2021). Non-resuscitative first aid training and assessment for junior secondary school students: A pre-post study. *Medicine*, 100(34).
- Connolly, M., Toner, P., Connolly, D., & McCluskey, D. R. (2007). The ‘ABC for life program—teaching basic life support in schools. *Resuscitation*, 72(2), 270-279.
- Eisenburger, P., & Safar, P. (1999). Life supporting first aid training of the public—review and recommendations. *Resuscitation*, 41(1), 3–18.
- Fleischhackl, R., Nuernberger, A., Sterz, F., Schoenberg, C., Urso, T., Habart, T., ... & Chandra-Strobos, N. (2009). School children sufficiently apply life-supporting first aid: a prospective investigation. *Critical Care*, 13(4), 1-7.
- Frederick, K., Bixby, E., Orzel, M. N., Stewart-Brown, S., & Willett, K. (2000). An evaluation of the effectiveness of the Injury Minimization Programme for Schools (IMPS). *Injury Prevention*, 6(2), 92-95.
- He, Z., Wynn, P., & Kendrick, D. (2014). Non-resuscitative first-aid training for children and laypeople: a systematic review. *Emergency Medicine Journal*, 31(9), 763-768.
- Hill, K., Mohan, C., Stevenson, M., & McCluskey, D. (2009). Objective assessment of cardiopulmonary resuscitation skills of 10–11-year-old schoolchildren using two different external chest compression to ventilation ratios. *Resuscitation*, 80(1), 96-99.
- Jaffe, E., Khalemsky, A., & Khalemsky, M. (2021). Game-related injuries in schools: a retrospective nationwide 6-year evaluation and implications for prevention policy. *Israel Journal of health policy research*, 10(1), 1-10.
- Jones, I., Whitfield, R., Colquhoun, M., Chamberlain, D., Vetter, N., & Newcombe, R. (2007). At what age can schoolchildren provide effective chest compressions? An observational study from the Heartstart UK schools training program. *BMJ*, 334(7605), 1201.
- Kuvaki, B., & Özbilgin, Ş. (2018). School Children Save Lives. *Turkish Journal of anaesthesiology and reanimation*, 46(3), 170.
- Lukas, R. P., Van Aken, H., Mölhoff, T., Weber, T., Rammert, M., Wild, E., & Bohn, A. (2016). Kids save lives: a six-year longitudinal study of schoolchildren learning

- cardiopulmonary resuscitation: Who should do the teaching and will the effects last?. *Resuscitation*, 101, 35-40.
- Mohajervatan, A., Raeisi, A. R., Atighechian, G., Tavakoli, N., & Muosavi, H. (2020). The Efficacy of Operational First Aid Training Course in Preschool Children. 22-17), 1(6.) □□□□□ □ □□□□□□□□□□□□□□□□□□□□. Retrieved from <https://www.researchgate.net/publication/349329367> The Efficacy of Operational First Aid Training Course in Preschool Children
- Perkins, G. D., Graesner, J. T., Semeraro, F., Olasveengen, T., Soar, J., Lott, C., ... & European Resuscitation Council Guideline Collaborators. (2021). European Resuscitation Council Guidelines 2021: Executive summary. *Resuscitation*.
- Plischewski, H., Kucirkova, N., Haug, I., Tanum, I., & Lea, S. (2021). Children save lives: evaluation of a first aid training in Norwegian kindergartens. *European Early Childhood Education Research Journal*, 29 (6), 813-827.
- Reveruzzi, B., Buckley, L., & Sheehan, M. (2016). School-Based first aid training programs: A systematic review. *Journal of school health*, 86(4), 266-272.
- Semeraro, F., Wingen, S., Schroeder, D. C., Ecker, H., Scapigliati, A., Ristagno, G., ... & Böttiger, B. W. (2018). KIDS SAVE LIVES—Three years of implementation in Europe. *Resuscitation*, 131, e9-e11.
- Toner, P., Connolly, M., Lavery, L., McGrath, P., Connolly, D., & McCluskey, D. R. (2007). Teaching basic life support to school children using medical students and teachers in a 'peer-training' model—results of the 'ABC for life program. *Resuscitation*, 75(1), 169-175.
- Tse, E., & Alexiou, G. (2021). First Aid Training to School Students: Should Younger Children Be Trained? *Indian pediatrics*, 58(11), 1099–1100.
- Tse, E., & Alexiou, G. (2021). Letter to the Editor: Non-resuscitative first aid training and assessment for junior secondary school students. *Medicine Correspondence Blog*, https://journals.lww.com/mdjournal/Blog/MedicineCorrespondenceBlog/pages/post.aspx?PostID=161&fbclid=IwAR0ZAm2_4dj06iozSIR6YXNFMLpbMyWVBF5D95S2SUuxged0rNCy5EMxb0.
- Tse, E., Plakitsi, K., Voulgaris, S., & Alexiou, G. A. (2022). First Aid Training for Children in Kindergarten: A Pilot Randomized Control Study. *Children (Basel, Switzerland)*, 9(11), 1626. <https://doi.org/10.3390/children9111626>
- Tse, E., Plakitsi, K., Voulgaris, S., & Alexiou, G. A. (2022). Teaching Cardiopulmonary Resuscitation and Defibrillation in Children. *Pediatric emergency care*, 38(9), e1577. <https://doi.org/10.1097/PEC.0000000000002815>
- Tse, E., Plakitsi, K., Voulgaris, S., & Alexiou, G. A. (2023). The Role of a First Aid Training Program for Young Children: A Systematic Review. *Children*, 10(3), 431.
- Wilks, J., & Pendergast, D. (2017). Skills for life: First aid and cardiopulmonary resuscitation in schools. *Health Education Journal*, 76(8), 1009-1023.

Creative Commons licensing terms

Author(s) will retain the copyright of their published articles agreeing that a Creative Commons Attribution 4.0 International License (CC BY 4.0) terms will be applied to their work. Under the terms of this license, no permission is required from the author(s) or publisher for members of the community to copy, distribute, transmit or adapt the article content, providing a proper, prominent and unambiguous attribution to the authors in a manner that makes clear that the materials are being reused under permission of a Creative Commons License. Views, opinions and conclusions expressed in this research article are views, opinions and conclusions of the author(s). Open Access Publishing Group and European Journal of Education Studies shall not be responsible or answerable for any loss, damage or liability caused in relation to/arising out of conflicts of interest, copyright violations and inappropriate or inaccurate use of any kind content related or integrated into the research work. All the published works are meeting the Open Access Publishing requirements and can be freely accessed, shared, modified, distributed and used in educational, commercial and non-commercial purposes under a [Creative Commons Attribution 4.0 International License \(CC BY 4.0\)](https://creativecommons.org/licenses/by/4.0/).