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Children save lives: evaluation of a first aid training in Norwegian kindergartens

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ABSTRACT

Part of effective Early Childhood Education and Care is to support children's awareness of hazards and management of possible injuries during risky play. This study evaluated the attitudes of Norwegian kindergarten teachers towards 'Henry first aid training' and its impact on 3-6-year olds' understanding of first aid. 588 kindergarten employees completed an online survey and 50 children (26 boys and 24 girls) participated in semi-structured interviews gauging their knowledge of first aid before and after using *Henry*. These children's knowledge of first aid was compared to 46 children who had used *Henry* over a longer period. Survey results indicated strong enthusiasm among kindergarten teachers for the use of *Henry*. Children's understanding of first aid increased from pre- to post- interviews, $t(43) = 8.878$, $p < .001$, Cohen's $d = 1.32$. Findings are discussed in relation to the international scalability of *Henry* and the need for training kindergarten teachers and children in first aid.

KEYWORDS

First aid; Red Cross; risk play; Norwegian kindergarten

An ongoing discussion in the early childhood literature revolves around the balance between risky and safe play for young children (Brussoni et al. 2015a; Waller et al. 2010). While the literature indicates many benefits of risky play for young children (Little and Eager 2010; Brussoni et al. 2015b; Sando, Kleppe, and Sandseter 2021), and children themselves show a preference for more challenging playground equipment to experience risk (Jongeneel, Withagen, and Zaal 2015), there is a continuous erosion of children's risky play in children's daily lives, with policies, regulatory frameworks and curricula designed to minimise risk experienced by children in natural environments (Little, Wyver, and Gibson 2011; Harper 2017). It is against this backdrop that educational organisations and professionals develop approaches that equip children with skills and knowledge to be more resilient towards possible injuries and thus enhance their risk management in play. This perspective is embedded in the approaches that aim to teach children first aid skills and increase their knowledge about injuries and health conditions. Our work identifies with this perspective, and in this paper, we

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address the research gap concerning first aid training in kindergartens, with an empirical study examining teachers' attitudes and children's knowledge of first aid in Norway.

Theoretical framework

This study is based on a socio-cultural theoretical framework (Vygotsky 1978; Moll 1990), which suggests that an individual's perception of risk varies across socio-cultural contexts. The socio-cultural context shapes children's agency, that is children's own choices and volition in learning and development. Children communicate their preferences verbally and non-verbally, and adults' role, according to the socio-cultural theory, is to create pedagogies and activities that accommodate children's voices and scaffold children's agency (see Löfdahl and Hägglund 2007; Wood 2014). Building on this theoretical foundation, we ground our approach to risky play in a systematic literature review finding that risky play has positive effects on children's health (Brussoni et al. 2015b) and the meta-analytical evidence that children of kindergarten age can recognise a dangerous situation and alert adults to accidents (He, Wynn, and Kendrick 2014).

Children's experience of risk and injuries

The experience of risk and injuries is part and parcel of children's learning and development, both indoors and outdoors. Risk comes with dangers but also benefits, and is thus not to be avoided but managed (Christensen and Mikkelsen 2008; Cooke, Wong, and Press 2021). Children seek out risk in their natural play, as documented by Sandseter (2009), who observed Norwegian children's outdoor play and noticed children's use of higher height and speed as an attempt to increase risk and excitement in their play. Sando et al. (2017) sent an electronic questionnaire to 6397 Norwegian kindergartens and asked them to retrospectively report the amount of injuries in their kindergartens in 2012. The results showed an average of 0.16 injuries per child per year, which is very low. On one hand, high adult support and supervision in kindergartens minimises the risk of injuries, with an overall low incidence of injuries in kindergartens (Morrongello 2005). On the other hand, children growing up in the twenty-first century are increasingly shielded from opportunities to manage their own experience of risk (Warden 2015; Lavrysen et al. 2017). The lack of risky play in kindergartens is of concern not only from a holistic learning perspective but also from a health perspective, given that indoor learning typically involves sedentary-based activities (Soini et al. 2016). One way of affording children the opportunity to knowledgeably manage their experience of risk is to teach them first aid skills. According to the Norwegian curriculum mandate, developing first aid skills should be an integral part of formal education in kindergartens and schools (Helsedirektoratet 2018).

Children's first aid skills

A meta-analysis concluded that children and young people are able to reliably learn and deliver first aid (He, Wynn, and Kendrick 2014). Bánfai et al. (2018) evaluated 118 Hungarian 5 to 7-year-olds, who were trained in first aid and tested immediately after the training, and again after four and 15 months. The children's knowledge of first aid

techniques improved significantly after the training, although there was a considerable dip in children's knowledge over time. Bollig, Wahl, and Svendsen (2009) found that after a short course of five lessons, six to seven-year-old Norwegian children were able to give basic first aid to an unconscious patient, and they retained the knowledge when assessed after six months. Similar results were shown in a small-scale study with ten Norwegian four-to-five year-olds (Bollig, Myklebust, and Østringen 2011), who were able to help an unconscious patient and retained the knowledge after seven months. In a study with French kindergartners by Ammirati et al. (2014), children were shown images of various situations with accidents and asked what they would do to help the depicted individuals. Some images showed real injuries (e.g. a boy lying by a ladder) and some not (e.g. a girl crying because someone damaged her doll). Children's answers were scored according to a pre-established framework and showed that children increased their knowledge of first aid situations after they were taught basic first aid skills by their teachers. These studies provide some evidence that first aid skills can be taught to young children, although questions remain regarding the retention of these skills over time.

To date, most research in this area has been limited to European 4 to 12-year-olds, with first aid training provided by teachers or trained professionals (Lenson and Mills 2016). Misconceptions about the importance of first aid training prevail among the general population, including teachers. Zvěřinová (2018) surveyed 2248 Czech primary and secondary teachers and found that misconceptions about children's ability to deliver first aid are greater among secondary school than primary school teachers. The author hypothesised that this might be due to the higher frequency with which the primary-school teachers have to handle injuries with younger children. Teachers' misconceptions can also be explained by the lack of national provision of first aid training. Our study aimed to examine Norwegian kindergarten teachers' attitudes towards first aid training developed for kindergarten children in Norway. In particular, we aimed to examine kindergarten staff's attitudes towards a first aid training resource developed and distributed by the Norwegian Red Cross. We also aimed to establish children's knowledge of first aid after they have been taught basic first aid skills using the Red Cross learning resource.

The Norwegian kindergarten context

Norway offers heavily subsidised pre-school education for children aged one to five. The curriculum has a strong emphasis on children's free play and the practice is characterised by frequent outdoor play, with kindergarten teachers reporting that children spend 70% in summer and 30% in winter semesters outside (Moser and Martinsen 2010). A central part of the Norwegian kindergarten curriculum is to teach children to support their own and others' wellbeing. The curriculum states that kindergartens should be a safe and challenging place that offers children a variety of tools to experience diverse interactions, a sense of community, and friendship. The role of kindergarten teachers is, among others, to support children in overcoming adversity and dealing with challenges and to get to know one's own and others' emotions (Ministry of Education and Research 2017). While first aid is not explicitly addressed in the curriculum document, there is a clear expectation for kindergartens to teach children life skills and to experience

both safe and risky play indoors and outdoors. Norwegian playgrounds are typically built to offer children diverse ways to experience risky play, with swings, slides, climbing frames and trees so that they can explore and manage risk in play and learning. This approach seems to work well to minimise injuries, with reports showing the minimal incidence of accidents and injuries in Norwegian kindergartens (Sando et al. 2017).

Red cross

The International Federation of Red Cross and Red Crescent Societies (IFRC) was founded in 1919, at the suggestion of Henry Davison, the then president of the American Red Cross War Committee (IFRC, [online](#)). IFRC's mission is to 'champion the individual and community values which encourage respect for other human beings and a willingness to work together to find solutions to community problems', with seven values: humanity, impartiality, neutrality, independence, voluntary service, unity and universality (IFRC, [online](#)). Part of IFRC's work is to offer first aid training courses. National IFRC branches develop their own approaches to first aid training, for example Red Crescent Society in Iran incorporates first aid training as part of the Khadem plan in the form of an educational mobile app (Gilavand 2019). The Norwegian Red Cross offers first aid courses in local communities and in 2011, developed a dedicated learning resource for kindergartens, which is the subject of this study.

Henry – first aid for kindergarten children

The development of a dedicated first aid learning programme for kindergarten children was initiated by Rogaland Red Cross in 2008 at the requests from Rogaland kindergartens. Rogaland Red Cross decided to develop a learning resource aiming to increase children's knowledge of Red Cross' humanitarian values, willingness to help others and knowledge of first aid, and invited Laerdal Medical to participate in the development. Over the course of two years «Henry – First Aid for kindergarten children » resource was developed in close collaboration with local kindergartens who gave input and user-tested the materials, as well as a drama teacher, illustrator and musician. Since 2011, *Henry* has been freely distributed to 5200 kindergartens across Norway.

The resource is centred around the figure of *Henry* (EU designreg.nr. 01197859), named after the founder of the Red Cross, Henry Dunant. The programme consists of a puppet 'Henry dukken', accompanied with a little first aid kit, a memory stick with three *Henry* songs, a set of posters, a guide with background information and ideas about how to use *Henry*, as well as notes and lyrics to the songs.

The learning material is presented by *Henry* in ten different scenarios, where he has injured himself (small injuries such as cuts and bruises) and needs help. The illustrations suggest that children help *Henry* in the suggested sequence of 'ask – alert adults – help', that is first investigate the situation, then show concern and then seek adult help. This sequence was specifically developed by Red Cross and it corresponds to literature that suggests that young children can be taught to call for help (Lockey and Georgiou 2013) and that they can recognise an emergency, stay safe and alert adults appropriately (Bernardo, Doyle, and Bryn 2002).

The Norwegian Red Cross offers *Henry* to kindergartens for free. The material can be used in different ways, thus affording teachers flexibility in using its various components. In our evaluation, we focused on teachers' perceptions and attitudes of the *Henry* learning resource as a set, with all its elements. We aimed to establish both teachers' perspectives and children's learning with the *Henry* approach. Our research questions were:

What are Norwegian kindergarten teachers' attitudes towards the use of the first aid resource in their kindergartens?

Does the use of the *Henry* training resource impact children's knowledge of first aid?

Methodology

Two key data collection methods were used: an online survey for adults and semi-structured interviews with children. The two methods were selected for both pragmatic and theoretical reasons. The survey was used to provide structured evidence of adults' views on the *Henry* training resource, thus gauging the contextual aspects of its use in kindergartens. As time- and cost-effective methods, surveys enable data collection from a large number of respondents, which was necessary in the national implementation of *Henry* in Norway. Interviews with children were selected with the intention to include children's voices in understanding the impact of the use of *Henry* and create the opportunity for researchers to directly speak and listen one-to-one to children's views and experiences concerning the resource.

Teachers' survey

The purpose of the online survey was to map teachers' attitudes towards first aid training, as well as usage patterns and experience with the *Henry* training resource. The Directorate of Education provided the research team with contact information for all kindergartens in Norway. An invitation to participate in the online survey was sent to 3099 kindergarten directors. The questions were phrased as statements about teachers' reasons for *Henry*'s use, impact on children and degree of satisfaction as Yes/No questions or with a scale of 1–6 (Fully Agree, Agree, Slightly Agree, Disagree, Completely Disagree). There were also questions regarding the frequency and context of using *Henry* and one open-ended question for participants' own comments. The survey was designed to take approximately 15 minutes to complete.

Children's interviews

To establish children's knowledge of first aid after they participated in the *Henry* training, we conducted face-to-face interviews with a small group of children. The children were selected on the basis that *Henry* had not yet been used in their kindergarten. The interviews were carried out by a researcher, in a quiet corner of the kindergarten, following a standard procedure (interview protocol) for all children. The interview protocol involved some open-ended questions and some specific questions related to pictures of *Henry* in five different situations, asking children to identify what had happened and what they would do to help. After reviewing all situations, the children were asked to arrange the pictures in order from least to most dangerous. The children were also asked which

Table 1. Scoring of children's answers in pre- and post-interviews.

Categories	Criteria	Scoring
Recognition of the scenarios	The child described the situation/accident illustrated in the picture.	0 points for incorrect answer 1 point for each correct answer Max 5 points
Shows concern	The child suggested contacting <i>Henry</i> /Henriette, finding out what had happened and comforting or otherwise showing care.	1 point for each situation in which the child suggested showing care Max 4 points
Alert adults	The child suggested calling or telling adults.	1 point for each situation the child suggested alerting adults Max 4 points
Contacts medical help	The child suggested contacting a doctor, ambulance, hospital or 113. Considered correct only for the two critical injuries (choking and unconscious victim).	Max 2 points
Treatment	The child suggested the correct first aid treatment for each injury.	Max 7 points
Total first aid score	Concern + alert adults + contact medical help + treatment	Max 17 points

telephone number they would call if someone had been injured and needed help and about their experience of helping others. Some interviews were attended by a kindergarten employee, who was instructed not to influence children's answers in any way. Each interview lasted between ten to forty minutes and was audio-recorded. Follow-up interviews, after first-aid training in the participating kindergartens, took place approximately three months after the initial interviews. These interviews followed the same procedure except for the pictures: while the pre-interviews only involved pictures of *Henry*, post-interviews involved pictures of a doll named Henriette in identical situations. The use of a different character mirrored literature that shows bias in children's answers based on image-recognition rather than learning effects (Blom and Unsworth 2010).

Transcribed interviews were scored using a researcher-developed scoring system (see Table 1). To minimise researcher bias, the researchers scored a selection of interviews together to check the alignment between their interpretation of the scoring system and data, and then they scored transcripts that were not part of the interviews they conducted themselves. Building on previous studies (e.g. Bollig, Myklebust, and Østringen 2011; Ammirati et al. 2014), we scored children's awareness of specific treatments of injuries, their knowledge of the emergency number and the need to alert adults in the case of a major incident.

As we had no baseline data of Norwegian children's first aid knowledge in this study, we included a 'reference group' in our evaluation. This group consisted of children who had already used *Henry* during the past 12 months. The reference group participants were only interviewed once to provide us with a sense of baseline data. The first-aid knowledge in the reference group was expected to be higher compared to the intervention group at pre-interview, but not at the post-interview stage.

Participants

Survey participants

3099 kindergartens were invited to participate in the online survey, of which 982 responded. These 982 respondents were included in the analysis of general questions concerning the importance of first aid in kindergarten children. Out of the 982

respondents, 588 reported they had used *Henry* in the last 12 months and were therefore included in an evaluation of the *Henry* resource. With a required 95% confidence interval and 4% margin of error for statistical comparisons, 588 is a sufficient number for a representative sample (minimum would require 503 respondents). 94.9% of the survey respondents identified as female ($N = 555$), 4.4% as male ($N = 26$) and 0.7% ($N = 7$) did not indicate their gender. The respondents' average age was 43 years and they mostly identified as teaching leaders or kindergarten teachers.

Interview participants

56 children (30 boys and 26 girls) from 5 kindergartens participated in the pre-interviews and 50 children (26 boys and 24 girls) in the post-interviews. The reference group consisted of 46 children (19 boys and 27 girls) from seven kindergartens. Children were aged between four and six years and had Norwegian as their mother tongue. Due to little or no response from some children during the interviews, a total of 92 children were included in the final analysis, 50 from the intervention group and 42 from the reference group.

Analysis procedure

Survey and interview data were analysed using the IBM SPSS Statistics (Release 25.0.0.1), with a combination of descriptive analyses, parametric and non-parametric tests to establish statistically significant differences between pre- and post-test results and between the intervention and reference interview groups.

Ethical considerations

The study was approved by the Norwegian Centre for Research Data (NSD). Teachers, parents, and guardians were provided with written information about the project. Parents gave written consent for their children to participate in the interviews. The children were informed that participation was voluntary and that they could withdraw consent at any time without any consequences. The researchers made every effort to make the children feel comfortable in the interviews, and in some cases, if the child wanted a kindergarten employee to join the interview, this was accommodated.

Results

Teachers' survey

Ninety-two percent of 982 respondents reported that they considered first aid training for children important. About 67.6% of the respondents agreed completely with the statement that it was parents' responsibility to provide first aid training to children, while 64.1% of teachers completely agreed that it was the kindergarten's responsibility. Only 18.1% of respondents thought that it should be The Red Cross' responsibility to train children in first aid. The participants rated their general skills in first aid high: 70% of respondents completely agreed that they had sufficient first aid skills and 29% partly agreed that they had sufficient first aid skills.

In the analysis of the 588 kindergartens that used *Henry*, 66.6% of respondents indicated that they used the resource as part of their planned activities. The respondents had a very positive attitude towards the *Henry* learning resource: 88.2% completely agreed that they liked the scheme, 92.7% completely agreed that it was easy to teach children first aid and 90.6% completely agreed that it engaged children. Most employees used the scheme with older children (81% of kindergartens used it with 5 to 6-year-olds), while 69.9% used it with 3 to 4-year-olds and 34.5% with children under the age of three. Over 90% of the kindergarten employees used *Henry* because it engaged the children. The various elements of the *Henry* kit were experienced to engage the children to vary degrees, but the *Henry* puppet was perceived as the most engaging element (94.4% of respondents) and the music least engaging (40.3% of respondents).

The usage of the resource varied: some kindergartens organised their own *Henry* classes (59.5%), some used *Henry* when someone was injured (41.2%), and some brought *Henry* on excursions (28.2%). Most kindergartens (72.4%) focused on a specific injury in the training. 54.9% of the kindergartens used *Henry* to also talk about feelings and emotions. The respondents reported that many of their children had the opportunity to try first aid in training, either on *Henry* or on each other. About 48.4% tried to clean wounds and 66.5% to put on plasters, 55.4% had tried to put *Henry* or people into the recovery position. 42.5% of the kindergarten employees completely agreed that *Henry* has contributed to more first aid as a theme in children's play. 66.5% agreed that children had increased knowledge of first aid after they used *Henry*.

Interview results

Children's understanding of first aid increased from pre- to post- interviews ($t(43) = 8.878$, $p < .001$, Cohen's $d = 1.32$) in all domains measured, including showing concern and offering comfort to others ($t(41) = 7.469$, $p < .001$, Cohen's $d = 1.14$), alerting adults that someone is injured ($t(42) = 5.902$, $p < .001$, Cohen's $d = 0.89$) or knowing the emergency number (Wilcoxon signed rank test Z -value = 4.786, $p < .001$, effect size $r = 0.775$). Children's knowledge of treatment of minor injuries increased from pre- to post-test too, as captured in Tables 2 and 3.

The scores from the reference group were higher compared with the intervention group at pre-interview for all tested variables (see Table 4).

The scores from the reference group were either lower or not significantly different compared with the intervention group at post-interview for all tested variables, indicating a similar, or possibly higher learning rates within the first three months of first aid training with *Henry* (see Table 5).

Table 2. Children's scores from pre-and post-interviews regarding minor injuries.

	Pre-test			Post-test			t-value	p value
	M	SD	Range	M	SD	Range		
Cuts	1.04	0.46	0–2	1.17	0.67	0–2	1.231	0.224
Burn	0.33	0.47	0–1	0.69	0.48	0–1	4.346	0.001 ^a
Choking	0.18	0.39	0–1	0.36	0.53	0–2	2.233	0.031 ^a
Unconsciousness	0.02	0.15	0–1	0.49	0.72	0–2	4.510	0.001 ^a
Total treatment	1.59	0.87		2.66	1.31		5.685	0.001 ^a

^aSignificant at 1% level, paired samples two-tailed t-test.

Table 3. All tested variables, differences between pre-test and post-test for the intervention group.

Variable	Pre-test intervention group		Post-test intervention group		t-value	p value
Recognition of the scenarios	$M = 3.10$	$SD = 0.89$	$M = 4.72$	$SD = 0.61$	$t(49) = 12.405$	0.001^a
Shows concern	$M = 0.30$	$SD = 0.46$	$M = 1.86$	$SD = 1.35$	$t(43) = 7.469$	0.001^a
Alert adults	$M = 0.32$	$SD = 0.74$	$M = 1.77$	$SD = 1.38$	$t(43) = 5.902$	0.001^a
Treatment	$M = 1.59$	$SD = 0.87$	$M = 2.66$	$SD = 1.31$	$t(43) = 5.685$	0.001^a
Total score	$M = 2.91$	$SD = 1.70$	$M = 7.04$	$SD = 2.755$	$t(44) = 8.878$	0.001^a

^aSignificant at 1% level, paired samples two-tailed *t*-test.

The selected quotes illustrate the nature of children's answers in the post-interviews. One of the pictures showed *Henry* cutting himself when peeling an apple and the children were asked what they would do to help *Henry*. A five-year-old girl responded as follows (the translation is ours):

I would have said to Henry what happened? What happened Henry? And then he'll tell me, and then (...) I try to comfort him a bit and say: hmm, it's going to be ok now. I'll get, I'll get an adult ... and then the adult clean it, and they can use a tweezers and put on a plaster.

A five-year-old boy responded:

Ehm ... we must ask where it hurts and then get an adult, and then, if it's deep we must stich. If it's not deep, then we must clean the wound and put on a plaster.

Interviewer: Lovely. How did you learn all this?

Boy: Down there on Asene (unit at Kindergarten). We had a Henry – class, and then we learned all about nurses.

When asked (at post interview) if they had helped someone in the preschool, the children had many relevant examples, including practical help such as tidying up, putting dishes on the table and preparing meals, but also assistance if someone couldn't reach an item or help peers getting speed on the swing. Many children gave examples of caring behaviour, as shown in the first quote from a girl in the intervention group and the second quote from a girl from the reference group.

If they are sad, we tell them that it's going to be all right, and when they are scared (...) NN always starts to cry when she sees a wasp which she thinks will bite her, but then I just say I will brush it away when it comes near you.

Table 4. Pre-test in the intervention group versus reference group.

Variable	Pre-test intervention group		Reference group		t-value	p value
Recognition of the scenarios	$M = 3.10$	$SD = 0.89$	$M = 4.08$	$SD = 0.91$	$t(86) = 5.069$	0.001^a
Shows concern	$M = 0.30$	$SD = 0.46$	$M = 1.21$	$SD = 1.32$	$t(32,727) = 3.546$	0.001^a
Alert adults	$M = 0.32$	$SD = 0.74$	$M = 1.55$	$SD = 1.55$	$t(36,520) = 3.999$	0.001^a
Treatment	$M = 1.59$	$SD = 0.87$	$M = 2.41$	$SD = 1.32$	$t(43,946) = 2.953$	0.005
Total score	$M = 2.91$	$SD = 1.70$	$M = 6.13$	$SD = 3.35$	$t(73) = 4.866$	0.001^a

^aSignificant at 1% level, independent samples two-tailed *t*-test.

Table 5. Post-test in intervention group versus reference group.

Variable	Post-test intervention group		Reference group		t-value	p value
Recognition of the scenarios	$M = 4.72$	$SD = 0.61$	$M = 4.08$	$SD = 0.91$	$t(60,933) = 3.748$	0.001 ^a
Shows concern	$M = 1.86$	$SD = 1.35$	$M = 1.21$	$SD = 1.32$	$t(76) = 1.470$	0.814
Alert adults	$M = 1.77$	$SD = 1.38$	$M = 1.55$	$SD = 1.55$	$t(76) = 0.239$	0.270
Treatment	$M = 2.66$	$SD = 1.31$	$M = 2.41$	$SD = 1.32$	$t(76) = 0.855$	0.775
Total score	$M = 6.78$	$SD = 2.81$	$M = 6.13$	$SD = 3.35$	$t(77) = 0.916$	0.444

^aSignificant at 1% level, independent samples two-tailed *t*-test.

I would tap him on the back and then (...) we have talked about this in the kindergarten, so I would take him like this, and so and so and turn him around, and then put his arm under his head. [demonstrating recovery position]

Discussion

Early Childhood and Education Care (ECEC) settings that include first aid programmes in their curriculum are at the forefront of high-quality, evidence-based, education programmes that support children's well-being and care by scaffolding children's risk management. Such approaches do not only innovate but also inspire ECEC policy and practice towards empowering children's agency, as envisioned in socio-cultural learning models. With the increased urbanisation and sterilisation of children's environments worldwide, attention to children's risky play is becoming an attractive antidote to the wider regulated environment children are exposed to (Harper 2017). Teaching children basic first aid skills and awareness of hazards in natural environments is thus even more important.

The *Henry* learning resource is a useful resource for kindergarten teachers to structure their conversations around first aid, in a child-friendly language and visual representations. The illustrated situations, songs and puppet make it easier for teachers to include first aid into daily conversations. Findings from the survey and from children's interviews showed that the use of the *Henry* first aid learning resource was received enthusiastically by Norwegian kindergarten teachers and increased children's understanding of the key first aid concepts. After using *Henry*, children were able to make suggestions for dealing with minor injuries and seek help in the case of a major incident. The majority of interviewed children knew the emergency number after the training and gave more accurate answers about the seriousness of various situations and their corresponding need for medical help. Our findings thus indicate that the *Henry* approach is an effective method for offering first aid training in Norwegian kindergartens. Nevertheless, we caution against the conclusion that *Henry* could be used in other kindergarten contexts to the same positive effect as observed in our study. One should bear in mind three factors. First, the cultural specificity in the development process of the resource limits its applicability in other countries. Given that the Norwegian branch of the Red Cross, Norwegian artists and local kindergartens were involved in the development of *Henry*, the scenarios, songs, and aesthetics of the resource are culturally specific to Norway. In

other countries, such as for example Iran, the Khadem first aid training app developed by the Iranian Red Crescent Society focuses on natural disasters and major incidents. Second, the learning resource is specific to kindergartens, even though the surveyed teachers clearly viewed first aid training as a joint responsibility between families and kindergartens. To our knowledge, there is no research on families' readiness and knowledge concerning first aid training, and future research could explore the usefulness of *Henry* or similar learning resources in collaboration with families of young children. Third, the highly tactile and tangible nature of *Henry* limits its scalability and use in a mobile society and particularly so at times of national lockdowns due to virus pandemics. A digital alternative, such as, for example, an app with images and guided feedback, might usefully supplement an analogue first aid learning resource. Such an application would need to be tested with children and follow the principles of user-centred design, as argued, and prototyped by Wulandari, Effendy, and Wisudiawan (2018), who tested a first aid training app with ten 10 to 12-year-olds in Indonesia.

Despite a widely documented acknowledgment among the surveyed teachers that first aid training for children is important, only about half of the surveyed kindergartens included first aid training into their yearly curriculum. First aid training competes with other themes and topics in the national curriculum and tends to be under-prioritised in the daily kindergarten programme. This is not unique to the kindergartens surveyed in our study: Bakke, Bakke, and Schwebs (2017) reported similar concerns in their study with Norwegian primary schools. Even though the primary school teachers perceived first aid training as an important and laudable learning objective, there was not sufficient specification of its place in the national curriculum, which subsequently led to its minimisation, and in some cases, elimination, from the kindergartens' daily plans.

For children to know how to perform first aid, their teachers must be trained. While the guidance provided in the *Henry* learning resource was found to be self-explanatory and sufficient by our kindergarten teachers, there are other studies that show lack of training. Teachers can be trained relatively easily, as demonstrated by López et al. (2018), who followed the training of 81 teachers in Spain in a quasi-experimental design and showed that these teachers were able to deliver good-quality resuscitation to cardiac arrest victims after a short intense course. Marchiori et al. (2012) compared Spanish secondary school students' scores on first aid knowledge after they played a video game and after they followed instruction by a trained physician and showed that the group receiving instruction by a trained physician had higher scores than the group using the game only. Thus, whether in the form of an app or an educational video game, first aid training needs to be supervised and supported by feedback from a trained adult. The flexibility of using *Henry* in correspondence with existing resources in the kindergarten might partially explain the positive results found in our study.

Study limitations

We found relatively strong learning effects among the interviewed children and an overly enthusiastic response from surveyed teachers in relation to *Henry*. These positive findings need to be tempered with the fact that *Henry* is the only first aid learning method available to Norwegian kindergartens and likely the only first aid training resource that the children and staff had access to. While the survey provided direct

evidence of adults' perceptions across multiple aspects of the *Henry* resource, the survey responses may have included incorrect or socially desirable responses. Children's interviews incorporated children's voices and picture-based question prompts, but the interviews were highly structured, so children were not as free to express their own views as we would have liked with our socio-cultural approach. Future studies could adopt an open-ended structure for interviews with children and use more creative methods to solicit their responses, such as children's own drawings, possibility to express their views through movement or digital artefacts (see Clark 2017).

With a low or no baseline, the likelihood to find a positive increase in scores is, therefore, naturally high. Furthermore, the lack of a control group and random assignment in our study does not allow us to draw any causal interpretations of results, and we cannot know whether the changes in children's knowledge of first aid training were attributable to the *Henry* learning resource or to other influences in the kindergartens. Nevertheless, our findings provide an indication of possible increases in children's learning and together with the results from the reference group, also in relation to time and knowledge retention. A rigorous experimental procedure or a randomised controlled trial would be difficult in this context, given the strong emphasis on collaboration, voluntary and humanitarian focus of Red Cross and local participating partners. Future research might follow up our findings longitudinally to establish whether the observed learning effects persist over time.

Study implications

Learning materials, such as *Henry*, provide a viable and effective resource for Norwegian kindergartens interested in furthering children's knowledge about first aid. The learning resource could be usefully implemented in more kindergartens in Norway and with some adjustments, possibly in other countries. Given the major differences among countries in terms of their geographical, cultural and climatic conditions, we caution against overinterpretation of our positive findings and suggest that interested practitioners and policy-makers collaborate with local partners (kindergartens, artists, Red Cross or other large voluntary organisations) to adopt similar approaches to young children's first aid training. We also recommend involving parents and children's families in this work and to consider technological solutions to expand first aid training options.

In conclusion, our evaluation showed that children could acquire basic first aid knowledge through the *Henry* Red Cross training programme. The training resource engaged the children as it referred to their everyday experiences, described injuries in a child-friendly way, and contained resources that children could easily relate to. Considering the extant literature and the participants' views in our study, we suggest that it is important to distinguish between children's and adult's responsibility regarding basic first aid training, and that young children can be taught basic skills using a child-friendly training resource.

Disclosure statement

The lead author has no conflict of interest to declare. Two co-authors are employees of Red Cross. One of the co-authors is employed by Laerdal Medical. One of the co-authors is a volunteer for Red Cross.

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References

- Ammirati, C., R. Gagnayre, C. Amsallem, B. Némitz, and M. Gignon. 2014. "Are Schoolteachers Able to Teach First aid to Children Younger Than 6 Years? A Comparative Study." *BMJ Open* 4: e005848–e005848.
- Bakke, H. K., H. K. Bakke, and R. Schwebs. 2017. "First-aid Training in School: Amount, Content and Hindrances." *Acta Anaesthesiologica Scandinavica* 61 (10): 1361–1370.
- Bánfai, B., A. Pandur, B. Schiszler, E. Pék, B. Radnai, H. Bánfai-Csonka, and J. Betlehem. 2018. "Little Lifesavers: Can we Start First aid Education in Kindergarten? – A Longitudinal Cohort Study." *Health Education Journal* 77 (8): 1007–1017..
- Bernardo, L. M., C. Doyle, and S. Bryn. 2002. "Basic Emergency Lifesaving Skills (BELS): A Framework for Teaching Skills to Children and Adolescents." *International Journal of Trauma Nursing* 8 (2): 48–50.
- Blom, E., and S. Unsworth. 2010. *Experimental Methods in Language Acquisition Research (Vol. 27)*. London: John Benjamins Publishing.
- Bollig, G., A. G. Myklebust, and K. Østringen. 2011. "Effects of First aid Training in the Kindergarten - a Pilot Study." *Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine* 19: 13.
- Bollig, G., H. A. Wahl, and M. V. Svendsen. 2009. "Primary School Children are Able to Perform Basic Lifesaving First aid Measures." *Resuscitation* 80 (6): 689–692.
- Brussoni, Mariana, Sara Brunelle, Ian Pike, Ellen Beate Hansen Sandseter, Susan Herrington, Heather Turner, Scott Belair, Louise Logan, Pamela Fuselli, and David J Ball. 2015a. "Can Child Injury Prevention Include Healthy Risk Promotion?" *Injury Prevention* 21: 344–347.
- Brussoni, Mariana, Rebecca Gibbons, Casey Gray, Takuro Ishikawa, Ellen Sandseter, Adam Bienenstock, Guylaine Chabot, et al. 2015b. "What is the Relationship Between Risky Outdoor Play and Health in Children? A Systematic Review." *International Journal of Environmental Research and Public Health* 12 (6): 6423–6454.
- Christensen, P., and M. Mikkelsen. 2008. "Jumping off and Being Careful: Children's Strategies of Risk Management in Everyday Life." *Sociology of Health & Illness* 30 (1): 112–130.
- Clark, A. 2017. *Listening to Young Children, Expanded Third Edition: A Guide to Understanding and Using the Mosaic Approach*. London: Jessica Kingsley Publishers.
- Cooke, M., S. Wong, and F. Press. 2021. "Towards a re-Conceptualisation of Risk in Early Childhood Education." *Contemporary Issues in Early Childhood* 22, 5–19.
- Gilavand, A. 2019. "The Impact of Using the Iranian Red Crescent Society Educational Mobile App on Improving the Students' Awareness of First Aids." *Journal of Comprehensive Pediatrics* 10 (1): e67828.
- Harper, N. J. 2017. "Outdoor Risky Play and Healthy Child Development in the Shadow of the "Risk Society": A Forest and Nature School Perspective." *Child & Youth Services* 38 (4): 318–334.
- He, Z., P. Wynn, and D. Kendrick. 2014. "Non-resuscitative First-aid Training for Children and Laypeople: a Systematic Review." *Emergency Medicine Journal* 31 (9): 763–768.
- Helsedirektoratet. 2018. Sammen redder vi liv – en nasjonal dugnad for å redde liv ved hjertestans og andre akuttmedisinske tilstander utenfor sykehus. IS-2702. <https://helsedirektoratet.no/Lists/Publikasjoner/Attachments/1424/Sammen%20redder%20vi%20liv%20-%20strategidokument%20IS-2702.pdf>.
- IFRC. online. International Federation of Red Cross and Red Crescent Societies. <https://media.ifrc.org/ifrc/>.

- Jongeneel, D., R. Withagen, and F. T. J. M. Zaal. 2015. "Do Children Create Standardized Playgrounds? A Study on the gap-Crossing Affordances of Jumping Stones." *Journal of Environmental Psychology* 44: 45–52.
- Lavrysen, A., E. Bertrands, L. Leyssen, L. Smets, A. Vanderspikken, and P. De Graef. 2017. "Risky-play at School. Facilitating Risk Perception and Competence in Young Children." *European Early Childhood Education Research Journal* 25 (1): 89–105.
- Lenson, M. S., and J. Mills. 2016. "First aid Knowledge Retention in School Children: A Review of the Literature." *Australasian Journal of Paramedicine* 13 (1): 1–7. Accessed 2 September 2020. https://researchbank.acu.edu.au/cgi/viewcontent.cgi?referer=https://scholar.google.co.uk/&httpsredir=1&article=6553&context=fhs_pub.
- Little, H., and D. Eager. 2010. "Risk, Challenge and Safety: Implications for Play Quality and Playground Design." *European Early Childhood Education Research Journal* 18 (4): 497–513.
- Little, H., S. Wyver, and F. Gibson. 2011. "The Influence of Play Context and Adult Attitudes on Young Children's Physical Risk-taking During Outdoor Play." *European Early Childhood Education Research Journal* 19 (1): 113–131.
- Lockey, A. S., and M. Georgiou. 2013. "Children Can Save Lives." *Resuscitation* 84 (4): 399–400.
- Löfdahl, A., and S. Hägglund. 2007. "Spaces of Participation in Pre-School: Arenas for Establishing Power Orders?" *Children & Society* 21 (5): 328–338.
- López, M. P., S. Martínez-Isasi, R. Barcala-Furelos, F. Fernández-Méndez, D. V. Santamariña, L. Sánchez-Santos, and A. Rodríguez-Nuñez. 2018. "A First Step to Teaching Basic Life Support in Schools: Training the Teachers." *Anales de Pediatría (English Edition)* 89 (5): 265–271.
- Marchiori, E. J., G. Ferrer, B. Fernandez-Manjon, J. Povar-Marco, J. F. Suberviola, and A. Gimenez-Valverde. 2012. "Video-game Instruction in Basic Life Support Maneuvers." *Emergencias* 24 (6): 433–437.
- Ministry of Education and Research. 2017. *Framework Plan for the content and tasks of kindergartens*. <https://www.udir.no/globalassets/filer/barnehage/rammeplan/framework-plan-for-kindergartens2-2017.pdf>.
- Moll, L. C. 1990. "Instructional Implications and Applications of Socio-Historical Psychology." In *Vygotsky and Education*, edited by L. C. Moll, 1–27. Cambridge: Cambridge University Press.
- Morrongiello, B. A. 2005. "Caregiver Supervision and Child-Injury Risk: I. Issues in Defining and Measuring Supervision; II. Findings and Directions for Future Research." *Journal of Pediatric Psychology* 30 (7): 536–552.
- Moser, T., and M. T. Martinsen. 2010. "The Outdoor Environment in Norwegian Kindergartens as Pedagogical Space for Toddlers' Play, Learning and Development." *European Early Childhood Education Research Journal* 18 (4): 457–471.
- Sando, O. J., R. Kleppe, and E. B. H. Sandseter. 2021. "Risky Play and Children's Well-Being, Involvement and Physical Activity." *Child Indicators Research*, 14 (4): 1435–1451.
- Sando, O. J., E. B. H. Sandseter, I. Pareliussen, and C. K. Egset. 2017. "Injuries in Norwegian Early Childhood and Care (ECEC) Institutions." *Journal of Nordic Early Childhood Education Research* 14 (1): 1–15. ISSN 1890-916.
- Sandseter, E. B. H. 2009. "Affordances for Risky Play in Preschool: The Importance of Features in the Play Environment." *Early Childhood Education Journal* 36 (5): 439–446. doi:10.1007/s10643-009-0307-2.
- Soini, A., J. Gubbels, A. Sääkslahti, J. Villberg, S. Kremers, D. Van Kann, and M. Poskiparta. 2016. "A Comparison of Physical Activity Levels in Childcare Contexts among Finnish and Dutch Three-Year-Olds." *European Early Childhood Education Research Journal* 24 (5): 775–786.
- Vygotsky, L. S. 1978. *Mind in Society: The Development of Higher Psychological Processes*, edited by M. Cole, V. John-Steiner, S. Scribner, and E. Souberman. Cambridge, MA: Harvard University Press.
- Waller, T., E. B. H. Sandseter, S. Wyver, E. Årlemalm-Hagsér, and T. Maynard. 2010. "The Dynamics of Early Childhood Spaces: Opportunities for Outdoor Play?" *European Early Childhood Education Research Journal* 18 (4): 437–443.
- Warden, C. 2015. *Learning with Nature: Embedding Outdoor Practice*. London: Sage.

- Wood, E. A. 2014. "Free Choice and Free Play in Early Childhood Education: Troubling the Discourse." *International Journal of Early Years Education* 22 (1): 4–18.
- Wulandari, E., V. Effendy, and G. A. A. Wisudiawan. 2018, May. "Modeling User Interface of First-Aid Application Game Using User Centered Design (UCD) Method." 6th International Conference on Information and Communication Technology (ICoICT) (pp. 354–359). IEEE.
- Zvěřinová, G. 2018. *Analysis of First Aid Misconceptions among Teachers at Elementary and Grammar Schools in the Czech Republic* [Analýza miskoncepčí v první pomoci u pedagogů základních škol a gymnázií v České republice]. Thesis submitted to Charles University. Accessed 7 September 2020. <http://hdl.handle.net/20.500.11956/102347>.