

Disaster Education for Young Children: A Systematic Review and Thematic Analysis

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Abstract

The aim of this systematic review is to search for, gather, and synthesize studies on disaster education for children in the early childhood period. Studies that implemented and evaluated the results of a disaster education program for children aged 3 to 6 years old were examined. For the purpose of this study, the focus was on disasters caused by nature induced hazards (earthquake, wildfire, tsunami, flood, volcano eruption, storm, avalanche, tornado, landslide, hurricane, blizzard). A large number of diverse databases such as Emerald, ERIC, JSTOR, ProQuest, SAGE Journals Online, Science Direct, Scopus, SpringerLink, Taylor & Francis Online Journals, Web of Science, Wiley Online Library were searched using a wide range of keywords, resulting in the identification of seven studies from peer-reviewed journals. These studies were examined through thematic analysis. The results highlight the different strategies and materials that researchers utilized for teaching young children about disasters, as well as the various evaluation methods used to assess young children's disaster-related knowledge. Furthermore, it was found that across all examined studies, there was a positive impact of disaster education on children's disaster related knowledge. It is hoped that this review will shed light on an underrated yet crucial research area, attracting more attention and providing a starting point for rapid improvement.

Keywords

Disaster education, early childhood education, hazards, systematic review.

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INTRODUCTION

Natural hazards have had a considerable impact on human society and civilization since the dawn of existence. Such hazards like earthquakes, floods or wildfires are almost impossible to predict. To protect societies against such immense, unpredictable events, it is crucial to be prepared and maintain constant alertness (United Nations Office for Disaster Risk Reduction [UNDRR], 2020). Efficient preparation for hazards requires understanding what hazards are, their potential effects, and strategies to prevent or minimize their negative consequences (Shaw et al., 2012; UNDRR, 2015). If societies fail to be prepared for such hazards, these hazards could evolve into disasters (Disaster and Emergency Management Presidency [AFAD], n.a.; UNDRR, 2020). Accordingly, disasters have the potential to cause serious disruptions to society which would require a significant number of resources and time to restore (UNDRR, 2016).

In disasters, one demographic enduring substantial physical and emotional strain, both during the events and in their aftermath, is children (Yeh, 2010; Torani et al., 2019). Each year, an increasing number of children are affected both directly and indirectly by nature induced disasters (United Nations Children's Fund [UNICEF], 2022). Numerous studies exhibit the negative effects of these disasters on children (Shaw et al., 2012; Karabulut & Bekler, 2019; Yeon et al., 2020; Drolet et al., 2021). Children, due to their inherent physiological attributes and limited experience confronting difficult situations, are often identified as one of the most vulnerable demographics during disasters (Torani et al., 2019). These factors frequently result in a lower survival rate for children compared to adults in disasters (Shaw et al., 2011; Kousky, 2016; Limoncu & Atmaca, 2018; Karabulut & Bekler, 2019; Yeon et al., 2020; Drolet et al., 2021). Despite being designated as one of the most sensitive groups needing defensive measures against disasters, children also carry the potential to participate in reducing the consequences and risks associated with disasters (Forthegill, 2017). Many researchers have consistently emphasized the importance of teaching children disaster preparedness skills from an early age as a powerful strategy for mitigating the negative effects of disasters on them (Kousky, 2016; Limoncu & Atmaca, 2018; Torani et al., 2019; Ebbeck et al., 2020; UNICEF, 2022).

The way to equip children with disaster preparedness skills is through disaster education (Wisner, 2006; Vaughter, 2016). Disaster education refers to the education of individuals about disaster preparedness, response, and recovery (Shaw et al., 2012). In several aspects, educating children about disasters and their prevention proves more beneficial compared to doing the same with adults. Children, especially in early childhood, are able to integrate what they have learned into their lives more effectively than adults (Organization for Economic Co-operation and Development [OECD], 2016; Liquin & Gopnik, 2022). This approach would yield a better result in terms of costs and effectiveness compared to educating adults (Bhandari, 2014). Also, integrating disaster education to children's school programs would be easier than creating opportunities for adults to attend disaster education programs (Lopez et al., 2012; Proulx & Aboud, 2019). Many international initiatives have targeted this issue (UNDRR, 2007; UNDRR, 2015; UNICEF, 2022). However, despite numerous global organizations emphasizing the importance of disaster education, there are very few studies on it (Dufty, 2020).

In this regard, studies that design different activities and programs to teach young children about disasters are crucial. Moreover, the review studies that provide a starting point for researchers and portray the current state of the literature are important. Thus, the main purpose of the current study is to systematically review the related literature on disaster education for young children at the early

childhood education level. Also, to present the general characteristics, contents, evaluation methods, and outcomes of the disaster education activities and programs that were designed for young children.

METHOD

This study is designed as a systematic review. A systematic review is defined as a method aiming to address a specific subject or question by transparently searching, collecting, analyzing, and synthesizing all relevant research (Jesson et al., 2011). This approach aids in identifying gaps in the field and guides future research on the selected subject (Petticrew & Roberts, 2008). For data analysis, the study utilized thematic analysis, a method used for organizing and detailing data sets, as well as identifying and synthesizing the patterns within the data (Braun & Clarke, 2006). In addition, it is important to note that throughout this study the term *disaster* is used to describe an event triggered by nature induced hazards that cause economic, social and physical damage to society (UNDRR, 2016). More specifically, the scope includes sudden-onset disasters caused by suddenly and unexpectedly emerging hazardous occurrences like floods, storms, volcanic eruptions, earthquakes, etc. (UNDRR, 2016).

Data Gathering Process and Criteria for Inclusion

There are various terminologies to refer to disaster education across different research fields. To be able to reach all related articles, a wide range of keywords were used to do the search in databases. Combination of terms “*disaster, hazard, natural hazard, earthquake, wildfire, tsunami, flood, volcano, volcano eruption, storm, avalanche, tornado, landslide, hurricane, blizzard*” and “*education, training, teaching, preparedness, readiness, awareness, literacy, risk reduction, mitigation*” were used. For example: “*disaster OR disaster education OR disaster training OR disaster teaching OR disaster preparedness OR disaster readiness OR disaster awareness OR disaster literacy OR disaster risk reduction OR disaster mitigation*”. After that, the search results were filtered with the following keywords that are related to early childhood education: “*early childhood OR early childhood education OR kindergarten OR preschool OR pre-school OR daycare OR young learners OR small children OR young children*”.

With the use of mentioned keywords, Emerald, ERIC, JSTOR, ProQuest, SAGE Journals Online, Science Direct, Scopus, SpringerLink, Taylor & Francis Online Journals, Web of Science, Wiley Online Library and additional databases registered on EBSCOhost were searched. Data collection was initially conducted by the primary author in July of 2022, and subsequently repeated independently by both authors in June of 2023 to verify whether there were any new additions. The inclusion criteria for the articles were as follows: they must be published in peer-reviewed journals, and they must be either in English or have an extended English abstract. No temporal limitations were imposed on the articles.

The initial database search yielded 1092 records. After gathering all of these records and eliminating any duplicates, the total was reduced to 681. Subsequently, studies that were reviews, book chapters, conference papers, gray literature, and news articles were excluded. This resulted in a count of 401 articles. Both authors independently screened the titles and abstracts of these remaining articles to assess their relevance to disaster education for young children. Inclusion criteria were articles that implemented or evaluated the effectiveness of an educational intervention regarding nature induced hazards for children aged between 3 to 6 years. Nine articles that met the criteria were identified with 100% agreement between the authors. Following this, full-text versions of these articles were

gathered. However, two articles were excluded because they were not published in peer-reviewed journals. The reference lists of the remaining seven articles were also screened for a reverse search, but no additional records were found that met the criteria of the study. Thus, seven articles were finally included in the present study.

Synthesizing

In the current study, the abstracts and titles of 1092 articles were scanned. As a result of the screening, seven full-text articles meeting the inclusion and exclusion criteria were compiled. Furthermore, descriptive characteristics of the articles in the sample were identified. Then, the articles were examined in depth by both of the authors via thematic analysis. The examination, as suggested by Braun and Clarke (2006) for thematic analysis, was completed in six steps: (1) the articles were examined in detail, (2) initial coding was performed, (3) themes and patterns were created, (4) themes were reviewed, (5) themes were collected under titles based on the aim of the study, (6) the results was presented in a meaningful and systematic way. Both authors adhered to these steps. The inter-coding agreement between the authors was checked according to the suggestions of Campbell et al. (2013) and was found to be 0.91.

RESULTS

This current systematic review brings together seven studies that implemented different disaster education programs and/or activities to children between the ages of 3 to 6 years old, assessing the impact on the children's disaster related knowledge. In the following section, the descriptive characteristics of these studies, along with the themes that have emerged from the coding process, are presented. Table 1 provides a summary of the demographic information of the studies.

Table 1*Summary of Demographic Information of the Studies*

No	Author(s)	Year	Country & Region	Participants	Aim of the Research	Design	Data Tools (To measure children's disaster knowledge)	Findings (Related to children's disaster related knowledge)
1	Gülay	2010	Türkiye (Denizli)	5 to 6 years old children (n=93)	Investigating the effects of an earthquake education program with parent participation on children's earthquake knowledge	Experimental with pre-test & post-test (Three groups)	Questionnaire with 9 Likert items 1 open ended item	The earthquake education program had significant positive effects on children's earthquake knowledge. The group with the parent participation had statistically higher scores than other groups.
2	Fetihi & Gülay	2011	Türkiye (İstanbul)	6 years old children (n=105)	Investigating effects of an earthquake education program on children's earthquake knowledge	Experimental with pre-test & post-test	Questionnaire with 8 Likert items	The earthquake education program had significant positive effects on children's earthquake knowledge.
3	Sharpe & Izadkhah	2014	Iran (Tehran)	5 to 6 years old children (n=31)	Developing comic strips to be used as a medium in earthquake education and evaluating the effectiveness of it	Case study	Interviews	3 weeks after given disaster education, randomly chosen children from the class were able to answer the majority of the earthquake related questions.
4	Izadkhah & Gibbs	2015	Iran (Tehran)	5 to 6 years old children (n=202)	Using children's drawings to evaluate their earthquake knowledge after receiving earthquake and safety education	Content analysis	Children's drawings	Analysis of the drawings showed that earthquake and safety lessons had a positive impact on children's earthquake related knowledge.

5	Proulx & Aboud	2019	Indonesia (Sumba)	5 to 6 years old children (n=203)	Investigating the effects of school-based disaster risk reduction program for young children on children's early learning skills, disaster knowledge and quality of school settings.	Quasi experimental with post-test only	Questionnaire with 5 items	Significance difference in disaster related knowledge on the children in the treatment group.
6	Solfiah et al.	2020	Indonesia (Riau)	5 to 6 years old children (n=48)	Developing pictured story books to be used as a medium in disaster education and evaluate its effects on children's related knowledge	Design-based research - For effectiveness Quasi-experimental one group with pre-test and post-test	Questionnaire (content not specified)	Significance difference in disaster related knowledge after receiving activities using designed story books based on pre and post-test scores on the same group.
7	Tuncer et al.	2021	Türkiye (Tokat)	3 to 5 years old children (n=40) & Their parents	Implementing an earthquake education program that involves different stakeholders and evaluating the effects of it on children's earthquake knowledge	Quasi-experimental one group with pre-test and post-test	Questionnaire with 8 Likert items + Children's drawings	Significant positive effects on children's earthquake knowledge.

Source and Date of Publication of the Studies

There was no time restriction imposed as an inclusion criterion. The collected studies have been conducted in 2010 (n=1), 2011 (n=1), 2014 (n=1), 2015 (n=1), 2019 (n=1), 2020 (n=1), 2021 (n=1). It was observed that the studies were published in different journals from the fields of disaster management [*International Journal of Disaster Risk Reduction* (n=2), *Disaster Prevention and Management* (n=1)] and education [*Educational Research and Review* (n=1), *International Journal of Educational Spectrum* (n=1), *International Online Journal of Educational Sciences* (n=1), *Jurnal Pendidikan Usia Dini* (n=1)].

Geographical Region of the Studies

The research locations of the studies were identified across six different regions within three distinct countries. There were studies from Indonesia, Iran, and Türkiye. In Indonesia, two studies (n=2) were conducted. One of these involved children from Sumba Island, while the other focused on Riau Province. Furthermore, there were two studies (n=2) conducted in Iran, with both selecting the city of Tehran as their research location. In addition, Türkiye was the site of three studies (n=3). The cities chosen as research locations in this country were Denizli, İstanbul, and Tokat. It is noteworthy that all studies incorporated into their disaster education activities and programs only the hazards to which their specific regions were prone to.

Participant Characteristics of the Studies

Resulting from the inclusion criteria, all studies incorporated young children (3 to 6 years old) as their participants. To specify, the age groups of the children included 3 to 5 years old (n=1), 5 to 6 years old (n=5), and 6 years old (n=1). Furthermore, one study incorporated parents into the subject group. Upon examination of the sample selection strategies, only three studies were found to have utilized random sampling in their research. Also, there was a variance in the sample group sizes among the studies as 30 to 50 (n=3), 80 to 100 (n=2), and approximately 200 (n=2). Aligned with their sample size, some of the studies worked with children from a single school setting (n=5) and some of them worked with children from different school settings (n=2). Some studies engaged with children from a single school setting (n=5), while others worked with children from multiple school settings (n=2). It should also be noted that none of the children participating in the studies had previous experiences with nature induced disasters.

Research Designs and Data Collection Tools of the Studies

The examined studies exhibited heterogeneity in terms of their research designs. Included were studies designed as quasi-experimental with pre-test and post-test (n=1), quasi-experimental with post-test only (n=1), experimental design with pre-test and post-test (n=2), content analysis (n=1), case study (n=1), and design-based research (n=1). Moreover, some studies were the results of a pilot study (n=2), and others were conducted within the scope of a financially supported projects (n=2). In accordance with their research designs, the studies employed different strategies for data collection procedures. In particular, six different data collection tools were utilized among the studies to assess the disaster-related knowledge of young children. These instruments were: analysis of children's drawings on disaster related topics via content analysis (n=2), a questionnaire form comprising eight Likert-type questions (n=2), interviews conducted with children (n=1), an open-ended questionnaire consisting of five questions (n=1), a questionnaire form that integrated nine Likert-type questions and

one open-ended question (n=1), and there was one study that utilized a questionnaire form, but did not disclose the specifics of their scale (n=1).

Definition and Inclusion of Disasters in the Studies

Throughout the articles, a lack of unity was noted in terms of terminology. Despite the context suggesting that the same concept was intended, several different terms were employed. Some studies used the terms *natural disaster* and *natural hazard* interchangeably (Sharpe & Izadkhah, 2014; Izadkhah & Gibbs, 2015; Proulx & Aboud, 2019). In contrast, others made no differentiation between hazards and disasters, solely using the term *natural disaster* (Gülay, 2010; Fetihi & Gülay, 2011; Tuncer et al., 2021; Solfiah et al., 2020). Furthermore, two studies were identified that focused on multiple hazards, whereas the remainder focused on a single one. Specifically, Proulx and Aboud (2019) incorporated earthquake, flood, and landslide into their disaster education program, and Solfiah et al. (2020) included earthquake, flood, landslide, tsunami, and wildfire in the picture books they designed for disaster education. Conversely, the remaining studies exclusively focused on earthquakes (Gülay, 2010; Fetihi & Gülay, 2011; Sharpe & Izadkhah, 2014; Izadkhah & Gibbs, 2015; Tuncer et al., 2021)

Contents of the Implemented Education Activities/Programs in the Studies

In the array of examined studies, researchers employed diverse ways to instruct young children about disasters, with variations observable in terms of time frame, content, teaching methods, activity types, and teaching materials. Certain researchers developed new instructional materials specifically for disaster education and evaluated their effectiveness through the execution of a single integrated activity (Sharpe & Izadkhah, 2014; Solfiah et al., 2020). Another study provided a foundational framework to in-service early childhood education teachers regarding disasters and safety, enabling them to adapt and implement these guidelines in their classrooms according to their specific pedagogical approaches (Izadkhah & Gibbs, 2015). Two further studies were found to have designed disaster education programs of different lengths: one spanning five days (Fetihi & Gülay, 2011), and the other ten days (Gülay, 2010). These programs included a variety of integrated activities intended for in-service teachers to carry out in their classrooms (Gülay, 2010; Fetihi & Gülay, 2011) and for parents to conduct at home with their children daily (Gülay, 2010).

Moreover, some studies implemented education programs aimed at not only engaging children in various learning activities, but also involving adults integral to the children's lives (Proulx & Aboud, 2019; Tuncer et al., 2021). In these comprehensive disaster education programs, researchers planned and facilitated workshops for a range of participants, including in-service teachers, parents, administrators, school staff (Proulx & Aboud, 2019; Tuncer et al., 2021), and community members (Proulx & Aboud, 2019). Additionally, these disaster education programs extended their impact to enhance physical resilience within the school setting, incorporating measures such as securing furniture, altering door mechanisms, applying clear films to windows, equipping schools with first aid kits and fire extinguishers, and installing exit signs. They also supported school administrators with disaster management planning, which involved establishing evacuation routes, formulating disaster plans, conducting regular drills, and creating contact lists for different hazardous scenarios. Both aforementioned studies were designed as projects with extended timeframes—one over twelve weeks (Tuncer et al., 2021) and the other spanning two years (Proulx & Aboud, 2019).

In addition, the content of disaster education activities, across all examined studies, was organized into several categories. These categories are detailed in Table 2 and were identified irrespective of the number or types of hazards that individual studies addressed.

Table 2

Content of the activities in terms of disaster education

Topics	n
Disaster preparation of school environment	7
What to do during a disaster	7
What to do after a disaster	7
Possible damages of disasters	7
Disaster preparation of home environment	6
Environmental awareness of the local area	4
Possible causes of disasters	4
Evacuation/Safe transportation	2
Risk concepts	2
Looking after pets during/after a disaster	1

The examination of the studies revealed that detailed information regarding teaching methods, activity types, and materials was not uniformly provided by every researcher. Nonetheless, data from the studies which did offer such information were thoroughly coded and categorized. Across these studies, a variety of teaching methods emerged. These were identified as demonstrating (n=6), describing (n=5), telling and instructing (n=5), teacher-led discussions (n=6), reading (n=5), encouraging and praising (n=3), facilitating (n=2), child-led discussions (n=2), and singing (n=1). As for activity types, children were exposed to disaster related topics through diverse activities like storytelling/drama (n=5), art (n=4), science (n=3), play (n=3), as well as language and literacy (n=3). Also, some studies enriched their disaster education programs with field trips. (n=2).

Furthermore, each study incorporated diverse materials to bolster their activities, tailored to the specific activity type. However, a shared approach across the studies involved the use of materials readily available in an average early childhood education setting based on the regional context. The rationale for this approach, as cited by several researchers, was to ensure the applicability of these activities for the demographic that their sample group represented (Gülay, 2010; Fetihi & Gülay, 2011; Proulx and Aboud, 2019; Tuncer et al., 2021). Additionally, two studies underscored the creation and use of novel materials explicitly crafted for teaching children about disasters. These included comic strips featuring a variety of characters in diverse earthquake and safety related scenarios (Sharpe & Izadkhah, 2014), and illustrated storybooks covering earthquakes, floods, tsunamis, wildfires, landslides and corresponding safety concerns (Solfiah et al., 2020). These materials were designed with the consideration of the regional context.

Outcomes and Research Limitations of the Studies

In an in-depth review of the results from all examined studies, it was noted that there was a significant increase in children's knowledge related to disasters. This knowledge included an understanding of

what hazards are, the actions that should be taken before, during, and after the occurrence of different types of hazards in a variety of environments, as well as basic safety measures. As briefly outlined earlier, various strategies were implemented to assess the knowledge of young children following the delivery of disaster education. With detailed investigation, a range of outcome indicators used by the researchers were identified. These have been categorized into twelve groups, as shown in Table 3.

Table 3

Outcome Indicators of the Studies

Indicators	n
Knowledge of safety during disasters	6
Knowledge of safety right after a disaster	5
Anxiety about disasters	4
Ability to identify different disasters in local context	4
Knowledge of causes of hazards	3
Knowledge of disaster preparedness in school context	3
Knowledge of contents of a disaster bag	3
Knowledge of disaster preparedness in home context	2
Ability to identify safe/unsafe places during disasters	2
Knowledge of causes of injuries	1
Knowledge of how to seek or offer support after a disaster	1
Knowledge of basic safety measures	1

The implemented disaster activities or programs across all studies demonstrated marked improvements in children's disaster-related knowledge. However, researchers also reported additional outcomes from these activities and programs. Proulx and Aboud (2019), for instance, observed that their disaster education program significantly improved the early learning skills and child-teacher interactions of children from low-income families compared to the control group. Their disaster education program comprised comprehensive disaster education workshops for in-service teachers, school staff, and community members. They attributed this outcome to the integration of sessions related to early childhood education in their teacher workshops, suggesting that teachers might have applied their newly-acquired knowledge in other classroom activities. Additionally, Gülay (2010) highlighted the positive impact of incorporating parent involvement activities into disaster education programs, noting a significant difference in the post-test scores of two experimental groups that had undergone disaster education with and without parent involvement activities.

Finally, researchers identified the limitations of the studies as having small (n=6) and non-randomized (n=4) sample groups, which both make the findings of their studies difficult to generalize to the wider population. Another stated limitation was the insufficient number of studies about disaster education for young children (n=6) in the literature. This shortage of research, they noted, hindered the formulation of more meaningful interpretations of their findings. Additionally, researchers offered several suggestions for future studies. Some of these recommendations included integrating disaster education into early childhood education curriculums (n=5) and pre-service teacher education

curriculum (n=3); incorporating parents into the disaster education programs for more effective, long-term results (n=3); utilizing various types of materials simultaneously to maintain young children's attention over extended periods (n=2); and employing multiple different measurement methods for assessing children's disaster-related knowledge (n=1).

CONCLUSION AND DISCUSSION

A considerable number of studies have been published on disaster education of children. Despite this, the amount that includes children from early childhood education level is very limited. This lack of focus has been acknowledged by numerous other researchers as well (Johnson et al., 2014; Amri et al., 2018; Torani et al., 2019; Proulx & Aboud, 2019; Koç et al., 2020). Besides the studies that focus solely on young children, which are reviewed in the current study, there are several studies that focus on a large sample of children from different age groups including children in the early childhood education level. However, when these mixed aged group studies are examined in detail two issues emerge. Firstly, the percentage of children who are aged 3 to 6 is very low compared to the whole sample group, producing insignificant data. Secondly, in some cases, the missing data were from those young children in the sample group due to the reason that many of them cannot perform well in the questionnaires designed for literate, older children. Thus, they were not included in the current study. Moreover, there were studies that investigated the aftermath of disasters in the context of early childhood education setting. These studies were excluded too because the focus of those studies was only on the recovery of affected children. Also, studies that investigated the disaster awareness of young children who did not receive any disaster related education were excluded as well due to their lack of disaster education activities or programs in their content. Additionally, Boland et al. (2017) emphasized the importance of the quality of the chosen documents in review studies. One of the quality criteria set by the authors for the documents in the sample group was being published in a peer reviewed journal. Some of the studies (n=2) from the initial data set had to be removed for not being published in a peer-reviewed journal. Reasoning behind this was to make findings of the current study to be credible and therefore, beneficial for other researchers. As a result, the sample of the current study consisted of the seven articles shown in Table 1.

While there was no time constraint for the publication years of the studies, the ones examined were only published between the years of 2010 and 2021. Disaster education for young children is relatively a new area of research (UNICEF, 2012), so it was expected that the publication years would fall within this timeframe. Although not directly linked, the emergence of these studies in the last roughly 13 years could be associated with the Hyogo Framework for Action (HFA). HFA was the first globally accepted disaster risk reduction strategy plan which was designed with the participation of various stakeholders, spanning the years from 2005 to 2015. One of the priority action items of the HFA was urging the usage of education, innovation and knowledge to create a culture of safety and resilience around the globe (UNDRR, 2007). Thus, policies to raise awareness about disasters were implemented, and disaster education drew the attention of the researchers from different fields more intensively following this (UNDRR, 2015).

The primary focus of the current study is disaster education for children at the early childhood education level. Although early childhood education typically encompasses birth to eight years (National Association for the Education of Young Children [NAEYC], 2020), the authors have set the cut-off for participant age groups at six years. This decision stems from the global average age for

children starting primary school being lower than eight (The World Bank, 2022). In disaster risk reduction related literature, studies that work with primary school children usually include a wide range of age groups together in their sample. Consequently, these studies employ disaster education materials and assessment methods suitable for older, literate children, rendering these studies less feasible within an early childhood education context. Hence, sample groups of children of the examined studies were in the age frame of 3 to 6 years. The majority of the sample group amongst studies were 5 to 6 years old children (n=6), with only one study incorporating a sample group of 3 to 5-year-olds. This age distribution might be due to individual countries' early childhood education policies regarding school starting age.

The researchers in most studies included a diverse age range of children in their sample (n=6), but their findings did not reflect this diversity. This could indicate either the absence of significant differences across the age groups, or that in-service teachers who implemented the activities were able to accommodate different age groups at their own pace. Nevertheless, there is no specific data to support these inferences. Another thing that was a uniform feature of the studies was the balance in gender distribution within their samples, with either an equal number of children from both genders or numbers that were very close to each other. Regarding outcome indicators based on genders, a significant difference was observed in only one category across all studies. Izadkhan and Gibbs (2015) reported that girls exhibited more anxiety related characteristics in their drawings than boys after receiving an education on earthquakes. In the existing body of literature on disaster education with children, there are only a handful of studies have found any difference on children's disaster related knowledge by gender and these instances favored girls (Johnson et al., 2014; Rahman, 2019). Given the limited sample size in these studies, there is not enough data to conclusively relate gender to disaster-related anxiety in this context.

As previously noted, researchers selected one or multiple hazards for their disaster education activities and programs. However, a shared trait among the studies was the selection of hazards based on their region's dominant natural hazard(s). For example, both studies from Iran (Sharpe & Izadkhan, 2014; Izadkhan & Gibbs, 2015) were conducted in Tehran, focusing on earthquake education. This choice aligns with Tehran's known susceptibility to earthquakes (United Nations International Strategy for Disaster Reduction [UNISDR], 2012). In another study from the Sumba Island of Indonesia, that chose to incorporate floods, earthquakes, and landslides in their disaster education program due to the region's propensity for these hazards (Proulx & Aboud, 2019). A further related issue with hazards was the inconsistent usage of the terminology across studies. Given that the examined studies were authored by researchers from various fields and, in some cases, by non-native English speakers, some misuse of terms or errors was expected, as might occur in the current study as well. The main concern, however, was the specific terms used within the disaster education content. The use of *natural disasters* instead of *nature induced/triggered/caused disasters* or interchangeable usage of the terms *hazards* and *disasters* was noted. One of the focal points of disaster education is to teach children that disasters are not natural. While they may be triggered by natural hazards, damages of disasters result from a lack of preparedness (UNDRR, 2020). Consequently, using the term *natural disasters* could lead to young children developing misconceptions and potentially missing the core concept behind disaster education.

A variety of approaches were observed when examining the activities used by researchers to educate children about disasters, especially concerning the timeframe. The studies that implemented a single disaster related activity for one time only, highlighted the importance of supplementing their approach with various activities and materials for long-term effect and suggested future researchers to do so (Sharpe & Izadkhah, 2014; Solfiah et al., 2020). On the other hand, a study that implemented a disaster education program for the entire school year mentioned the potential negative effects on children's school readiness, particularly for children from low socioeconomic families (Proulx & Aboud). They justified this statement with the fact that, due to an ongoing drought at the time, children from that region already faced difficulties attending school. Therefore, the limited school time was occupied by disaster education. In the light of these findings, a potentially more beneficial approach might be integrating disaster education into curriculums, as also suggested by other researchers as a more effective solution (Johnson et al., 2011; Johnson, 2014; Amri et al., 2018). Moreover, several categories emerged when evaluating the disaster-related content of the activities and programs as these were shown in Table 2. The content of the activities and programs from the studies were aligned with the suggested guidelines for disaster education content (Shaw et al., 2011; Bahandari, 2014; Shiwaku et al., 2016). Additionally, one of the studies (Sharpe & Izadkhah, 2014) included the concept of caring for pets during earthquakes as a part of their educational content. Researchers stated that this prompted children to engage in post-activity discussions about disasters. Children continued to talk about disasters from the point of view of their own pets, this approach fostered engagement as well as allowed children to explore disaster scenarios from diverse perspectives.

It is important to note that throughout all of the studies, except one (Sharpe & Izadkhah, 2014), in-service early childhood education teachers, rather than researchers, implemented the activities in their own classrooms. These in-service teachers received disaster, safety, and teaching method related workshops (Proulx & Aboud, 2019; Tuncer et al.) and/or were provided with pre-determined activity plans by researchers (Gülay, 2010), or they were given guidelines about the content of the activities (Izadkhah, 2014). Furthermore, some researchers highlighted the lack of knowledge among in-service teachers regarding disasters (Proulx & Aboud, 2019). As per the recent related literature, in-service teachers need to be trained to effectively teach children about disasters, given the misconceptions and anxiety teachers may have regarding disaster-related issues. The result of a study (Bulut, 2020) conducted with in-service early childhood education teachers (n=35) indicated that nearly 95% of the participants believe disaster education should be an integral part of every early childhood education curriculum. However, the majority of these participants stated that disaster education for young children in early childhood education settings should be guided by an expert or through a field trip to a professional institution. These results show that in-service teachers may not feel confident to teach children without receiving training themselves first. Moreover, another study that focused on in-service early childhood educators working in daycare centers to gather information about their disaster preparedness level (n=373) found similar results (Uhm, & Oh, 2017). In this instance, findings revealed that although the majority of the in-service teachers possessed knowledge in disaster-related issues, they felt inadequate to implement what they knew. Consistent with these studies, a study focusing on administrators from preschools also found that despite being knowledgeable about disaster-related issues, they felt incompetent in this regard (Konaklı, & Kaplan, 2018). Therefore, based on these findings, it can be inferred that providing guidelines or training to in-service teachers before allowing them to teach young children may have potentially increased the effectiveness of disaster

education for young children and perhaps improved in-service teachers' anxiety level and information regarding disasters.

In conclusion, considering the significance of disaster education for young children and the limited amount of research in this area, there is an urgent need for further study. For future research focusing on disaster education for young children, several recommendations can be made based on the collective results of the examined studies and related literature. Almost all of the studies about disaster education for children discuss only the short-term effects of disaster education activities and programs. Hence, there is a pressing need for longitudinal studies to investigate the long-term effects of disaster education programs implemented at the early childhood education level. It is believed that in-service early childhood education teachers, administrators, parents or primary care givers and school staff should be trained about disaster prevention methods and included in the disaster education programs for young children. Incorporating various stakeholders into disaster education programs and conducting regular drills with everyone's participation might enhance these programs' long-term effects. As suggested by many researchers, we concur that integrating disaster education into early childhood education curriculums and pre-service teacher education curriculums could be beneficial. This approach might increase awareness among teachers, boost their confidence in teaching disaster-related subjects, and potentially reduce overall casualties in hazardous situations. Additionally, it was observed that there was no information concerning children with special needs. Therefore, it would be beneficial to include information regarding inclusion of special needs children in future disaster related activity plans or disaster education programs. Lastly, it is hoped that by shedding a light into relevant literature, results of the current study will draw attention to the subject of disaster education for young children and serve as a foundation for future researchers.

Limitation

The present study's sample was restricted to articles from peer-reviewed journals, thus excluding theses, conference papers, book chapters, and gray literature. Moreover, it included only articles that were written in English. This approach potentially overlooked relevant research published in different languages, thereby limiting the comprehensive reach of the authors.

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