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# A scoping review of research on school-based outdoor education in the Nordic countries

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## ABSTRACT

Although there is a notion of a ‘Nordic tradition’ of outdoor education in the international literature, research from the Nordic countries is rarely included in research reviews. Therefore, this scoping review provides an overview of empirical studies on outdoor education (grades 1–13) from the Nordic countries. Of the 586 hits, 52 studies met the inclusion criteria and were subjected to descriptive and content analyses. The majority of the studies are qualitative and situated in primary school contexts. Multiple school subjects and science are the most common subject matter addressed by outdoor education, but *friluftsliv*, mathematics, and language are also represented. The content analysis indicates that teachers’ perspectives are most frequently investigated, followed by nature of outdoor education, well-being, and cognitive learning. Fewer studies investigate teaching and learning processes, digital resources, and education for sustainability outdoors. Suggestions for further research on outdoor education in Nordic countries are discussed.

## KEYWORDS

Outdoor education; scoping review; Nordic countries; udeskole/uteskole; *friluftsliv*

## Introduction

This scoping review aims to explore the extent and nature of the empirical research on school-based outdoor education conducted in the Nordic countries—Denmark, Finland, Iceland, Norway, and Sweden. Outdoor education builds on the idea that the location—its ‘where’—is a significant aspect of teaching and learning (Braund & Reiss, 2006; Jordet, 2010). The ‘where’ can be a variety of settings outside the school, for example, school grounds, city parks, museums, science centers, botanical gardens, farms, school gardens, nature parks, residential centers, and natural landscapes. Educational activities in these settings are associated with English terms such as field-work, field trips, excursions, outdoor learning and teaching, and ‘Learning outside the classroom’ (LOtC). However, outdoor education is not a specific method or approach but, rather, includes a variety of pedagogical approaches and practices, depending on the purpose and philosophies of learning outside the classroom (Dyment & Potter, 2015; Jordet, 2010; Skea & Fulford, 2021). Some of this variation in the practices and philosophies of outdoor education may be ascribed to cultural differences across schools, geographical regions, countries, and even continents (Atencio, Tan, Ho, & Ching, 2015; Larsson & Rönnlund, 2021; O’ Brien & Murray, 2007; Rea & Waite, 2009). The Nordic countries seem to receive attention in this regard. Descriptions such as ‘the Nordic outdoor culture’ signal that there is a perception of a strong tradition of outdoor activities and, hence, a strong tradition of outdoor education in Nordic schools (Leather, ; Rea & Waite, 2009). The tradition of being outdoors is related to the term *friluftsliv*, which is associated with a

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philosophy of connecting with nature (e.g. Naess, 1989). included in the national curricula of Physical Education (P.E.) in Norway and Sweden (Annerstedt, 2008), but it is less clear in the Danish and Finnish physical education curricula. More recently, the concept of *udeskole/uteskola/uteskole* has become dominant in the outdoor education literature in the Scandinavian countries—Denmark, Sweden, and Norway. Udeskole is defined as regular outdoor education that is led by school teachers, conducted in natural and cultural landscapes, and aimed at supporting learning in one or more school subjects, such as science, mathematics, social science, language arts, and physical education (Bentsen, Mygind, & Randrup, 2009; Fågerstam, 2014; Jordet, 2010). Similar notions of outdoor education seem to exist in Iceland and Finland. For example, outdoor education is encouraged through national curriculum guides for compulsory school in Iceland (Norðdahl & Jóhannesson, 2015). In this article, we review empirical research on outdoor education, which, in this context, comprises *udeskole*, *friluftsliv* in school contexts, and associated terms such as field trips and excursions.

Despite the notion of a 'Nordic tradition' of outdoor education in schools, research from the Nordic countries is barely mentioned in international literature reviews on outdoor education (Ayotte-Beaudet, Potvin, Lapiere, & Glackin, 2017; Becker, Lauterbach, Spengler, Dettweiler, & Mess, 2017; Jeronen, Palmberg, & Yli-Panuala, 2017; Kent, Gilbertson, & Hunt, 1997; Mygind et al., 2019b; Rickinson et al., 2004). For example, perhaps the most cited review is Rickinson et al.'s (2004) report published by Field Studies Council. One hundred and fifty texts on outdoor education published between 1993 and 2003 are reviewed, but only one of them originated in the Nordic countries (Palmberg & Kuru, 2000, from Finland). More recently, Ayotte-Beaudet et al. (2017) synthesized studies published between 2000 and 2015, using ERIC as the single database. Only one of the 18 articles identified was conducted in a Nordic context (Magntorn & Helldén, 2007, from Sweden). Similarly, Mygind, Kjeldsted, Hartmeyer, Myding, and Bølling (2019b) conducted a systematic review to explore the benefits of immersive nature experiences reported in research published in 2004–2017. In total, 36 controlled studies were identified, but only one Nordic study (Norwegian study by Fjørtoft, 2004) met the inclusion criteria for Mygind et al.'s (2019b) review. By contrast, six of 13 articles included in Becker et al. (2017) review, which aimed at documenting effects of regular outdoor education, were affiliated in a Nordic country (four from Denmark and one each from Sweden and Norway). Three of eight studies in Lohr et al.'s (2020) scoping review on the impact of school gardens on social and emotional learning were located in Nordic countries.

To summarize, studies from Nordic countries are included in some of the aforementioned review studies, depending on the scopes of the review articles or the year of publication. However, given the 'Nordic outdoor tradition' described above, we hypothesize that there is more empirical research on outdoor education in Nordic countries. Some research may be written in Nordic languages or published in Nordic educational journals, which are not captured by international databases. Therefore, the purpose of the present article is to review research on outdoor education conducted in the five Nordic countries and thus gain an overview of the body of empirical research literature. We carry out a scoping review strategy, which is appropriate when the body of literature has not yet been comprehensively reviewed and there is a need to investigate the extent, range, and nature of research to identify knowledge gaps (Chang, 2018; Levac, Colquhoun, & O'Brien, 2010; Munn et al., 2018; Peters et al., 2015). Hence, the present scoping review addresses the following research question: *What is the extent and nature of the empirical research on outdoor education in Grades 1–13<sup>1</sup> conducted in the Nordic countries?*

In line with the Nordic outdoor education tradition explained above, we focus on empirical research on school-based outdoor education in open-air settings, such as natural and cultural landscapes, school gardens, and schoolyards, in which the educational activity is led by the school's teachers. Hence, research on school-based education in outdoor settings led by an external expert (e.g. 'guide') is omitted in the present scoping review.

## Methods

In line with our purpose of investigating the extent and nature of empirical studies on outdoor education in Nordic countries, we applied scoping review strategies for the search, selection, and analysis of studies (Arksey & O'Malley, 2005; Levac et al., 2010).

### *Search strategy*

The search strategy for collecting the articles to be included in the review can be described as consisting of sequential phases—the identification of potentially relevant studies, selection based on inclusion and exclusion criteria, and an analysis of the selected articles. The search and selection process was carried out as teamwork between the authors, which is recommended for scoping reviews (Levac et al., 2010). The search strategy consisted of two phases, which are described in further detail below.

#### *Phase 1—identification of potentially relevant articles*

The identification phase involved database searches and manual searches. For the database searches, we developed two search strings—one in English and one comprising the Nordic languages. The English string included three components: (1) 'outdoor education' and all its associated terms, (2) school levels—from primary to upper secondary education, and (3) Nordic countries and languages. The Nordic search string contained only outdoor education and associated terms in all the Nordic languages (Danish, Finnish, Icelandic, Norwegian, and Swedish). See Appendix for complete search strings. Both authors performed individual searches in English in the ERIC Ovid, Scopus, and Google Scholar databases. Similarly, the Nordic search string was applied in the Idunn, DivaPortal, and Google Scholar databases. A university librarian was consulted to ensure that the search strings and the database searches were technically correct. The first database searches were undertaken in June 2020 and then updated in July 2021.

Manual searches were performed regularly until July 2021 by checking reference lists of articles identified in the database searches and searching in the Nordic journals: Nordic Studies in Science Education, MONA Journal (Mathematics and Science Education), Acta Didactica Norge, Acta Didactica Norden, International Journal on Math, Science and Technology Education (LUMAT), and Nordic Studies in Education. , 24 articles were identified through the manual searches.

The search phase resulted in 586 hits (562 from database search, 24 from manual search). The authors screened titles, abstracts, and keywords to remove duplicates and exclude irrelevant articles. This resulted in the identification of 89 potentially relevant studies.

#### *Phase 2—inclusion and exclusion criteria*

Along with reading the full texts of the 89 articles, we developed and refined the inclusion and exclusion shown in Table 1 so as to select articles that were aligned with the review's aim and the research question. This was done individually by each author before comparing our lists of criteria and included studies. In cases of disagreement, we reread and discussed the status of the articles until a consensus was reached (Levac et al., 2010). For example, to operationalize the criterion in Table 1 'the main focus is to investigate outdoor education outdoor education had to appear in the purpose of the study, research questions, and results. Consequently, articles in which the focus of outdoor education was unclear were excluded. This iterative process resulted in 52 articles to be included in further analysis.

**Table 1.** Inclusion and exclusion criteria of articles. The term ‘outdoor education’ applies to any of the equivalents of the concept in both English and the Nordic languages.

Inclusion	Exclusion
The main focus is to investigate outdoor education in a school setting.	Articles that mention outdoor education without having outdoor education as the main focus or purpose (e.g. outdoor education as one of several answers in a survey).
Outdoor education <b>conducted in a</b> school context and led by school teachers.	Articles investigating extra-curricular activities, spare-time activities, informal outdoor activities; etc. Educational activity led by outdoor education experts, e.g. museum educators, nature park guides, etc., or educational researchers.
Outdoor education conducted in open-air spaces, such as natural and cultural landscapes and school gardens. Situated in a Nordic country, e.g. the local area or region.	Outdoor education conducted in museums, science centers, zoos, botanical gardens, farms, and nature centers. Participants from Nordic educational institutions travelling to foreign countries.
Studies situated in primary school, secondary school, or upper-secondary school in the Nordic countries.	Articles that are based on data from both non-Nordic and Nordic participants. Studies from preschool, i.e. children under 6 years, and articles combining data from preschool and primary school contexts. Studies of outdoor education in higher education, including teacher education.
Description of methods for collecting and analyzing empirical data.	Articles that present empirical examples without describing the research methods.
Peer-reviewed journal articles.	Book chapters, reports, conference papers, and <i>grey</i> literature.

### ***Analysis of included articles***

To answer the research question and characterize the empirical research on outdoor education conducted in the Nordic countries, both descriptive and content analyses were conducted on the 52 selected studies, as recommended for scoping reviews (Arksey & O’Malley, 2005). The descriptive analysis considered the country in which the research was conducted, the subject matter or theme in focus for the outdoor education, the participants (teachers, students, and documents), the school levels, and the methodological approach. The content analysis was conducted inductively to identify the prevailing perspectives revealed in the aims and research questions offered in the selected articles. Of course, this categorization of the articles is qualitative and hence influenced by our understanding and interpretation of the content, which may represent a possible limitation of the results of the study.

## **Results**

Most of the studies included in the scoping review were published by researchers from Scandinavian countries, and the distribution of the studies is as follows: Denmark (N = 20), Norway (N = 15), Sweden (N = 11 articles), Finland (N = 6), and Iceland (N = 0). An overview of the 52 studies, along with findings from the descriptive and content analysis, is provided in Table 2. In the following, further details from the descriptive analysis are presented, as well as the findings from the content analysis.

### ***Results from the descriptive analysis***

From Table 2, it appears that most studies are conducted in the context of multiple school subjects in primary education, meaning that the outdoor education aims at supporting students’ learning of topics within several school subjects, for example, science, mathematics, social science and languages (e.g. Jørring, Bølling, Nielsen, Stevenson, & Bentsen, 2020; Kangas et al., 2014; Mygind, 2007). Mathematics is the subject matter context in two studies, both comparing the performance of students exposed to more outdoor education than the control group (Fägerstam & Samuelsson, 2014; Otte, Bølling, Elsborg, Nielsen, & Bentsen, 2019b). One Danish study mapped the influence of

**Table 2.** Studies included in the scoping review and summary of descriptive and content analysis.

Authors	Country	Subject matter context	School level and participants/data sources	Methodological Approach	Assigned category in content analysis
Aksland and Rundgren (2019)	Norway	Science	Primary and lower secondary 42 teachers	Qualitative (Questionnaire)	Teachers' perspectives
Backman (2011a)	Sweden	Friluftsliv within P.E.	Primary and lower secondary 12 teachers	Qualitative (Interviews)	Teachers' perspectives
Backman (2011b)	Sweden	Friluftsliv within P.E.	Primary and lower secondary Curriculum documents	Qualitative (text analysis)	Nature of outdoor education
Barfod et al. (2021)	Denmark	Not specified	Primary and lower secondary School management at 1,394 schools	Quantitative (survey)	Nature of outdoor education
Barfod and Stelter (2019)	Denmark	Multiple subjects (Mathematics and science)	Primary	Qualitative (Case study, interviews)	Nature of outdoor education
Barfod (2018)	Denmark	Not specified	Ten teachers Primary	Qualitative (Case study, interviews)	Teachers' perspectives
Barfod and Daugbjerg (2018)	Denmark	Multiple subjects (Mathematics and science)	Ten teachers Primary	Qualitative (Case study, observations and interviews)	Teachers' perspectives
Barfod et al. (2016)	Denmark	Multiple subjects (Mathematics and science)	Five teachers Primary and lower secondary School management at 336 schools	Quantitative (Survey)	Nature of outdoor education
Bentsen and Jensen (2012)	Denmark	Not specified	Primary and lower secondary 401 teachers and literature	Quantitative (Survey/literature review)	Nature of outdoor education
Bentsen et al. (2010)	Denmark	Multiple subjects	Primary and lower secondary School management at 1,073 schools	Quantitative (Survey)	Nature of outdoor education
Bølling et al. (2021)	Denmark	Multiple subjects	Primary 617 students	Quantitative (Accelerometer)	Well-being
Bølling et al. (2019a)	Denmark	Not specified	Primary and lower secondary 619 students (intervention group) 435 students (control group)	Quantitative (Survey)	Well-being
Bølling et al. (2019b)	Denmark	Not specified	Primary and lower secondary 511 students (intervention) 120 students (control group)	Quantitative (Questionnaire)	Well-being
Bølling et al. (2018)	Denmark	Not specified	Primary 911 students	Quantitative (Questionnaire)	Well-being
Dahl et al. (2019)	Norway	Friluftsliv within P.E.	Upper-secondary 41 teachers	Qualitative (Focus-group interviews)	Teachers' perspectives
Dahl et al. (2017)	Norway	Friluftsliv within P.E.	Upper-secondary 41 teachers	Qualitative (Focus-group interviews)	Teachers' perspectives
Dahl et al. (2016)	Norway	Friluftsliv within P.E.	Upper-secondary 155 teachers	Quantitative (Survey)	Teachers' perspectives

(Continued)



Table 2. (Continued).

Authors	Country	Subject matter context	School level and participants/data sources	Methodological Approach	Assigned category in content analysis
Eidissen (2018)	Norway	Multiple subjects	Online learning activities for outdoor education	Qualitative document analysis	Digital resources
Fägerstam and Grothéus (2018)	Sweden	Multiple subject (Mathematics and German)	Lower secondary 14 students	Qualitative (Case-study)	Cognitive learning
Fägerstam and Samuelsson (2014)	Sweden	Mathematics	Lower secondary students (Five classes)	Quantitative (Questionnaire)	Cognitive learning
Fägerstam (2014)	Sweden	Multiple subjects	Lower secondary 12 teachers	Qualitative (Interviews)	Teachers' perspectives
Fägerstam and Blom (2013)	Sweden	Multiple subjects (Biology and mathematics)	Lower secondary 88 students' responses to questions, 21 students interviewed	Mixed methods (essay-type questions and interviews)	Cognitive learning
Fiskum and Jacobsen (2013)	Norway	Multiple subjects	Primary Nine students	Qualitative (interviews)	Nature of outdoor education
Gabrielsen and Korsager (2018)	Norway	Not specified	Primary and lower secondary Eight teachers	Qualitative (interviews)	Sustainability education
Gustafsson et al. (2011)	Sweden	Multiple subjects	Primary 315 students	Quantitative (Questionnaire)	Well-being
Hartmeyer, Stevenson, and Bentsen (2016)	Denmark	Science	Primary Four teachers	Qualitative (Observations, focus-group interviews)	Teachers' perspectives
Hartmeyer and Mygind (2016)	Denmark	Multiple subjects (Danish and mathematics)	Primary Two teachers and five students	Qualitative (Case study, interviews)	Well-being
Henriksson (2018)	Finland	Science	Primary 15 teachers	Qualitative (Interviews)	Teachers' perspectives
Iversen (2021)	Norway	Science	Upper secondary Three students Teaching materials	Qualitative (Video observation, text analysis and field notes)	Cognitive learning
Jørring et al. (2020)	Denmark	Multiple subjects (Danish and mathematics)	Primary 10 students	Qualitative (Case study, interviews and observations)	Well-being
Kangas et al. (2014)	Finland	Multiple subjects	Lower secondary Eight students	Qualitative (Video observation, photos and field-notes)	Cognitive learning
Kervinen et al. (2020)	Finland	Biology	Lower secondary Three teachers	Qualitative (Interviews)	Teachers' perspectives
Leirhaug et al. (2020)	Norway	Friluftsliv withing P.E.	Upper secondary 20 students interviewed 142 students' responses to a questionnaire Participant observation by two researchers	Qualitative (Focus group interviews, observation and questionnaire)	Nature of outdoor education

(Continued)

Table 2. (Continued).

Authors	Country	Subject matter context	School level and participants/data sources	Methodological Approach	Assigned category in content analysis
Lyngstad and Sæther (2021)	Norway	Friluftsliv within P.E.	Upper secondary 37 students	Qualitative (questionnaire)	Nature of outdoor education
Manni et al. (2013)	Sweden	Science	Primary 209 students	Quantitative (Questionnaire)	Sustainability education
Mikaels (2018)	Sweden	Friluftsliv within P.E.	Lower secondary Eight teachers	Qualitative (Interviews, field notes)	Nature of outdoor education
Mygind (2010)	Denmark	Multiple subjects	Primary 19 students	Quantitative (Questionnaire)	Well-being
Mygind (2007)	Denmark	Multiple subjects	Primary 19 students	Quantitative (Physical activity monitoring)	Well-being
Mygind et al. (2019a)	Denmark	Science	Primary 20 teachers	Qualitative (Interview)	Teachers' perspectives
Otte et al. (2019a)	Denmark	Danish	Primary 911 students	Quantitative (Questionnaire)	Cognitive learning
Otte et al. (2019b)	Denmark	Mathematics	Primary 911 students	Quantitative (Questionnaire)	Cognitive learning
Remmen and Frøyland (2015a)	Norway	Geoscience	Upper secondary Three teachers and 39 students	Qualitative (Video observation, interviews)	Teaching and learning across classroom and outdoors
Remmen and Frøyland (2015b)	Norway	Geoscience	Upper secondary Three teachers and 18 students	Qualitative (Video observation)	Teaching and learning across classroom and outdoors
Remmen and Frøyland (2014)	Norway	Geoscience	Upper secondary Two teachers and their students	Qualitative (Video observations)	Teaching and learning across classroom and outdoors
Remmen and Frøyland (2013)	Norway	Geoscience	Upper secondary One teacher and 17 students	Qualitative (Video observations)	Cognitive learning
Rikala (2015)	Finland	Science	Primary One teacher and 19 students	Qualitative (Questionnaire)	Digital resources
Romar et al. (2019)	Finland	Multiple subjects	Primary Two teachers and 21 students	Mixed methods (Accelerometers and field notes)	Well-being
Rundgren et al. (2015)	Sweden	Science	Upper secondary 65 students	Mixed methods (Questionnaire)	Cognitive learning
Schneller et al. (2017)	Denmark	Not specified	Primary 317 students	Quantitative (Accelerometers)	Wellbeing
Uitto, Jouti, Lavonen, and Meisalo (2006)	Finland	Science	Lower secondary 3,626 students	Quantitative (Survey)	Nature of outdoor education
Wilhelmsson et al. (2012)	Sweden	Science	Primary Four teachers	Qualitative (Interviews)	Nature of outdoor education
Winje and Løndal (2021)	Norway	Not specified	PrimaryFive teachers	Qualitative (observations and interviews)	Teachers' perspectives

(Continued)





Table 2. (Continued).

Authors	Country	Subject matter context	School level and participants/data sources	Methodological Approach	Assigned category in content analysis
SUM OF STUDIES (N = 52)	Denmark (20), Norway (15), Sweden (11), Finland (6)	Multiple school subjects (16) Science (10) Friluftsliv (8) Geoscience (4) Mathematics (2) Danish language (1) Biology (1) Not specified (10)	Primary (22) Primary and lower secondary (10) Upper-secondary (11) Lower-secondary (8) Not specified (1) Students (21) Teachers (17) Teachers and students (7) Teachers and literature (1) School management (3) Texts (2) Students and teaching materials (1)	Qualitative (31) Quantitative (18) Mixed methods (3)	Teachers' perspectives (13) Nature of outdoor education (12) Well-being (11) Cognitive learning (9) Teaching and learning processes (3) Digital resources (2) Sustainability education outdoors (2)

regular outdoor education on primary students' reading performances in the Danish language (Otte et al., 2019a). Several studies from Norway investigate outdoor education in geoscience or friluftsliv at the upper-secondary level (Dahl, Lynch, Moe, & Aadland, 2016; Dahl, Moe, & Standal, 2017; Dahl, Standal, & Moe, 2019; Remmen & Frøyland, 2013, 2014, 2015a, 2015b). As potential explanations, geoscience is an optional program and friluftsliv is a part of an optional P.E. program, which both include outdoor education in the Norwegian national curricula, and there have been PhD research projects focusing on these subjects. Ten studies were coded as 'not specified' regarding subject matter, which means that the subject matter context is not clear to the reader or is not relevant to the study. For example, the subject matter context did not seem to be relevant in Barfod's (2018) study on teachers' perspectives, because the participating teachers conducted *udeskole* in various school subjects.

Qualitative studies dominate ( $N = 31$ ), and the empirical data were collected mainly from teachers and students. The methods used for data collection are primarily interviews and/or observation. School leaders and management rarely participated in studies on outdoor education but were included in two Danish studies (Barfod, Ejbye-Ernst, Mygind, & Bentsen, 2016; Bentsen, Jensen, Mygind, & Randrup, 2010). Texts are another rare data source, but they do appear in Backman's (2011b) analysis of documents regarding *friluftsliv* in Physical Education in Sweden, as well as in the Norwegian study analyzing web-based resources for outdoor activities in local forests (Eidissen, 2018).

Thirteen of 18 quantitative studies were conducted in Denmark, many being derived from larger research projects, such as TeachOut, examining outdoor education in primary school and lower secondary school, and involved surveys of a larger number of participants, usually several hundred (e.g. Bølling, Pfister, Mygind, & Nielsen, 2019a). Questionnaires are used in smaller studies, such as in the Danish study by Mygind (2007), involving 19 students. They are also used to generate qualitative data via participants' responses to open-ended questions (e.g. Aksland & Rundgren, 2019; Lyngstad & Sæther, 2021). Three studies describe their approach as mixed methods, combining qualitative and quantitative approaches to data collection and/or analysis. For example, Fägerstam and Blom (2013) conducted a quantitative analysis of students' written responses to explore the cognitive effects of an outdoor intervention. This was followed up by collecting qualitative data by interviewing 21 students five and seven months later.

### **Results of the content analysis**

The content analysis resulted in the following seven broad categories: teachers' perspectives, nature of outdoor education, well-being, cognitive learning, teaching and learning processes, digital resources, and sustainability education. Although each article is assigned to one category based on its aim and research questions, some articles may address more than one of the seven themes. For example, a study may include both digital resources and cognitive learning, but because digital resources are not emphasized in the article's aims and research question, it was categorized as 'cognitive learning.'

#### **Teachers' perspectives**

The category *teachers' perspectives* was applied to studies aimed at investigating teachers' experiences and views of outdoor education, such as opportunities and obstacles regarding teaching and learning. Thirteen studies were assigned to this category, with the majority being based on interviews and questionnaires. Teachers report positive experiences with outdoor education, such as increased communication and improved relationships with students, although they also note that students need time to adapt to the outdoors as a setting for learning (e.g. Barfod, 2018; Fägerstam, 2014; Mygind et al., 2019a). Teachers also highlight the importance of support from colleagues and school management for realizing outdoor education in schools (Barfod, 2018; Kervinen, Uitto, & Juuti, 2020; Winje & Løndal, 2021). However, some studies also describe that teachers lack time for outdoor

education and worry about students' safety while being outdoors (Backman, 2011a; Henriksson, 2018'; Winje & Løndal, 2021). By contrast, Mygind et al. (2019a) found that health and safety issues were *not* perceived as an obstacle among Danish primary teachers participating in the TeachOut project, which involves the regular practice of *udeskole*.

Health and safety is the main focus of the studies of teachers' perspectives on friluftsliv (Backman, 2011a; Dahl et al., 2016, 2017, 2019). This may not be surprising, because friluftsliv often involves longer trips into natural environments, accompanied by activities such as hiking and canoeing during the summer, as well as skiing and overnights in snow caves during the winter. The national survey among Norwegian teachers reveals that accidents and near-accidents occur regularly during such friluftsliv trips (Dahl et al., 2016). Following up on this risk of accidents, Dahl et al. (2019) found that the teachers' adapted their safety strategies and friluftsliv activities based on the students' friluftsliv experiences. Essentially, the teachers claimed that they observed a decline in students' friluftsliv skills and lack of friluftsliv experiences over time, which resulted in reluctance among these teachers to take students on demanding friluftsliv activities. In addition to the risks, time and locations were also barriers to teachers' practice of friluftsliv in Swedish compulsory school (Backman, 2011a).

### **Nature of outdoor education**

Studies aimed at discussing the ideal practices and potentials of outdoor education, often with a strong theoretical and philosophical perspective, were categorized as *nature of outdoor education* (N = 12). Teachers and school leaders are often the sources of information, but occasionally, students and texts were used as well. The studies from Denmark explore *udeskole*, which was previously defined as regular classes outside the classroom to teach school subjects. To map the extent of *udeskole*, Bentsen et al. (2010) conducted a national survey in Denmark and found that *udeskole* was practiced by 28% of the responding schools. Barfod et al. (2016) and (Barfod et al., 2021) followed up on previous surveys, such as Bentsen et al. (2010), concluded that the extent of *uteskole* in Danish schools had increased over the past years, although *udeskole* appears to decrease from primary to secondary school.

Regarding ideal *udeskole* practices, interviews with ten Danish teachers indicate that *udeskole* is recognized as an unpredictable setting for teaching and learning that allows for student-centered inquiries (Barfod & Stelter, 2019). The interdisciplinary inquiries that allow for the integration of theory and practice were also appreciated by the Swedish teachers interviewed by Wilhelmsson, Ottander, and Lidestav (2012). However, via interviewing four teachers in depth, Wilhelmsson et al. (2012) describe two different 'natures' of outdoor education. The first nature of outdoor education is a holistic perspective in which learning in classroom settings and learning in outdoor settings interact. The other nature of outdoor education considers the outdoors as a source to practical and concrete knowledge, while the classroom provides sources to theoretical knowledge. Teachers' views on the nature of outdoor education may influence their practices.

The Norwegian study by Fiskum and Jacobsen (2013) consider the nature of outdoor education from a student perspective. The authors propose that outdoor education provides various affordances, such as play and outdoor recreation activities, and conclude that these affordances are both directly and indirectly relevant to the Norwegian national curriculum. Backman (2011b) also has a curriculum perspective because this study aims at exploring the discrepancy between the nature of friluftsliv and the dominating pedagogic discourse of friluftsliv identified in Swedish curriculum and syllabus documents. The nature of outdoor education in friluftsliv within P.E. in Norway is explored in two studies, both arguing that friluftsliv enriches the nature of outdoor education in P.E. (Leirhaug, Grøteide, Høyem, & Abelsen, 2020; Lyngstad & Sæther, 2021). In addition, Leirhaug et al. (2020) propose that friluftsliv in P.E. contribute to education for sustainability.

### *Well-being*

Studies examining the potential impact of outdoor education on students' social, mental, and/or physical health are categorized as *well-being* (N = 11). Notably, several of the well-being studies were undertaken in a primary school context and involved a comparison of outdoor education to classroom-based teaching (Bølling, Niclasen, Bentsen, & Nielsen, 2019b; Bølling, Otte, Elsborg, Nielsen, & Bentsen, 2018; Gustafsson, Szczepanski, Nelson, & Gustafsson, 2011). In general, these studies conclude that outdoor education in schools has a positive influence on various aspects of student well-being. For example, regarding physical well-being, physical activity increased when primary school students were exposed to outdoor education during their school day (Bølling, Mygind, Mygind, Bentsen, & Elsborg, 2021; Mygind, 2007; Romar, Enqvist, Kulmala, Kallio, & Tammelin, 2019). Similar findings are also reported for social well-being. For example, Bølling et al. (2019a) found that students exposed to regular outdoor education showed the greatest improvement in social behavior. The social relations experienced during regular outdoor education can also have a long-term impact, as indicated by Hartmeyer and Mygind (2016), who interviewed two teachers and five students seven years after an *udeskole* period. Collaboration and engagement were benefits that influenced the students' social relations during the subsequent school years. Other studies recognize how diversity—such as gender, academic level, and socio-economic status—within groups of students influences their well-being during outdoor education (e.g. Bølling et al., 2019b; Gustafsson et al., 2011; Jørring et al., 2020). For example, Jørring et al. (2020) found that outdoor education influences students' social well-being but may distract low-achieving students, particularly boys. In Gustafsson et al.'s (2011) study, outdoor education had a greater impact on mental health among boys than girls.

### *Cognitive learning*

Studies investigating students' cognitive learning—that is, content knowledge and skills—achieved through outdoor education experiences are categorized as such. Several of these studies are based on quasi-experimental designs involving intervention groups and comparison groups (e.g. Fägerstam & Blom, 2013; Otte et al., 2019b, 2019a; Rundgren, Nyberg, Evers, & Alexandersson, 2015), with most finding that outdoor education has a positive impact on students' cognitive learning. For example, Otte et al. (2019a) found a small, positive impact on the part of regular outdoor education on student reading performance. Similarly, the Swedish studies found positive impacts on learning among secondary students exposed to regular outdoor education (Fägerstam & Blom, 2013; Fägerstam & Samuelsson, 2014). In contrast to the aforementioned results, Otte et al. (2019b) found no significant differences between primary students in intervention (outdoor) and comparison (classroom) groups when testing their performances in mathematics. Regarding upper-secondary school, in which outdoor education may happen more rarely, Rundgren et al. (2015) compared two student groups learning about flood risks—one exposed to a web-based program and another exposed to a physical outdoor program. Based on questionnaire data from the students, Rundgren et al. (2015) argued that the students achieved the same level of knowledge about flood risk but that the students who experienced the physical outdoor program also showed greater interest in and awareness of flood problems in general.

Student learning is also investigated by smaller qualitative studies not using comparison groups. For instance, Fägerstam and Grothérus (2018) interviewed 14 lower-secondary students who were exposed to regular outdoor education in mathematics to understand differences between learning in the classroom and learning outdoors. The students reported that they enjoyed learning outside, that they were more concentrated on the learning tasks, and that collaboration with peers in the outdoors increased their learning. The interview study also revealed factors that had a negative impact on student learning, such as weather conditions.

To explain the variation in students' cognitive learning, other small-scale qualitative studies explore the learning process leading to these outcomes. For example, by observing video data, Remmen and Frøyland (2013) tracked the students' learning processes regarding two concepts in geoscience: relative dating and rock identification. One year later, the students succeeded in completing a task about relative dating but revealed several conceptual errors when identifying rocks. The authors (Remmen & Frøyland, 2013) proposed that the difference in the students' understanding of the two concepts could be ascribed to how the content was organized and made available to the students during the outdoor education experience. The nature of the content is also the argument in Iversen's study (2021) on students in upper secondary school. Based on an analysis of videos and the teaching materials, it appeared that there was a lack of connection between the outdoor setting and the tasks the students were asked to accomplish.

### *Teaching and learning across classroom and the outdoors*

Studies collecting data on both teacher practice and student learning processes and aimed at investigating the connection between classroom and outdoor activities were categorized as *teaching and learning across classroom and the outdoors* ( $N = 3$ ). In the context of geoscience in upper-secondary school in Remmen and Frøyland (2014, 2015a, 2015b) collected video data to observe both the teaching perspective and student learning processes across preparation activities in the classroom, outdoor learning activities, and follow-up activities in the classroom. The findings indicated that there was not always coherence between the teaching and learning processes in the classroom and outdoors, and the authors argued that the quality of the learning activity provided by the teacher was of critical importance in supporting student learning and engagement.

### *Digital resources*

Research exploring how particular digital tools or web-based resources support teaching and/or learning in outdoor education was included in *digital resources* ( $N = 2$ ). One of the studies, that of Rikala (2015), collected survey data from teachers and students in a Finnish primary school about their use of a mobile application aimed at supporting plant identification during outdoor education. The results indicated that the mobile application enhanced the students' engagement in recording their own observations and sharing their observation records with peers. The other study in this category is Eidissen (2018), who investigated the online outdoor learning activities provided by a Norwegian interest organization in forestry. Analyzing the opportunities for learning theoretical knowledge provided in 61 outdoor learning activities, Eidissen (2018) concluded that they lacked an ecological perspective on the forest as an ecosystem. The reason for this, Eidissen (2018) advocates, may be the close economic relationship between the interest organization providing the online outdoor resources for schools and the forest industry.

### *Sustainability education outdoors*

There were two studies aimed at describing the role of outdoor education for sustainability, establishing the category of *sustainability education outdoors*. Gabrielsen and Korsager (2018) interviewed Norwegian teachers and identified the following opportunities provided by the local outdoor environment: exemplifying perspectives on sustainability, authentic, and experiential learning; possibilities for taking action; and influence on the affective dimensions of learning. The researchers argue that these opportunities afforded by outdoor education enable more contextualized practices within education for sustainable development (ESD).

Sustainability education outdoors is also the topic in Manni, Ottander, Sporre, and Parchmann (2013) article, which investigated Swedish primary students' perspectives on sustainability education embedding outdoor experiences. The questionnaire responses from students were used to document a variety of experiences—cognitive, practical, emotional, and social. Although the students came from schools with different sustainability and outdoor education profiles, Manni et al. (2013) claimed that outdoor education promotes education for sustainability.

## Discussion and conclusions

The aim of this scoping review was to gain an overview of the body of empirical research on school-based outdoor education in Nordic countries because many Nordic studies appear to have been excluded by the previous international review studies of outdoor education cited earlier. Considering the research question—regarding the extent and nature of empirical research in grades 1–13 in the Nordic countries—the inclusion and analysis of 52 studies show that outdoor education is a considerable field of educational research in the Nordic countries, especially in Denmark, Norway, and Sweden. As summarized in Table 2, the prevailing features of the body of research appear to be qualitative studies; multiple subjects or science as the subject matter context; primary school students and teachers as the data sources; and teacher perspectives, nature of outdoor education, or well-being as the main content. These prevailing features provides opportunities for accumulating knowledge of Nordic outdoor education research and expose knowledge gaps.

One feature to notice is that studies on *udeskole* in primary and lower secondary school, particularly from Denmark, focus on students' cognitive learning in multiple subjects and various aspects of well-being (Table 2). By contrast, the studies on outdoor education in upper-secondary school aim at supporting learning in specific themes or subjects, such as science, geoscience, or *friluftsliv*, and these studies were categorized as cognitive learning, teacher perspectives, or teaching and learning processes across classroom and the outdoors. Notably, none of the studies from upper secondary school were categorized as well-being. Hence, there is a possibility for further research to widen the scope of outdoor education research, for example, by exploring whether and how outdoor education contributes to upper-secondary students' well-being.

Another factor worth noting is the studies revealing that the Nordic teachers see few obstacles with outdoor education. This contrasts with other international research that documents teachers' experiences of obstacles to outdoor education (e.g. Dymont, 2005; Feille, 2017). It may be ascribed to the nature of *udeskole*, in which regular use make teachers and students accustomed to the outdoor learning environment and, thus, obstacles become less prominent (Fägerstam & Blom, 2013; Mygind, Bølling, & Barfod, 2019a). Nonetheless, obstacles to outdoor education were experienced by Nordic teachers as well, particularly during *friluftsliv* activities (e.g. Backman, 2011a; Dahl et al., 2016, 2017, 2019). Taken together, the findings from the Nordic studies indicate that obstacles depend on the type of outdoor activity—whether it is adventurous *friluftsliv* or *udeskole* in the local environment—and the teachers' and students' prior experiences with being and learning outdoors.

Another potential obstacle for Nordic teachers, particularly upper-secondary teachers, appears to be designing sufficient tasks for outdoor learning. This is supported by the studies included in the present review which found that there is not always coherence between learning tasks and the possibilities for learning in the outdoor setting (Iversen, 2021; Remmen & Frøyland, 2013). Hence, it can be argued that the quality of the tasks influences the learning potential and outcomes of outdoor education experiences. However, this is only a hypothesis based on a few qualitative studies, and hence, further research may analyze the kinds of tasks and activities teachers' actually design to support student learning during outdoor education. This argument can be followed up by other studies in our scoping review, particularly those categorized as *teaching and learning processes across classroom and outdoors*, in which investigated how teaching provides an opportunity (or not) for students to progress their learning through preparation, outdoor activities, and follow-up work (e.g. Remmen & Frøyland, 2014). Despite that the Nordic researchers emphasize the importance of connecting classroom and outdoor learning experiences to support learning (e.g. Fägerstam, 2014), there are relatively few Nordic studies investigating the potential learning trajectories students take across classroom and outdoor settings. Rather, the Nordic research on cognitive learning in outdoor education ( $N = 9$ ) often involve quasi-experimental designs (Table 2), that is, a control group and intervention (outdoor) group are commonly used to contrast the outcomes of classroom and outdoor learning (e.g. Fägerstam & Samuelsson, 2014; Otte et al., 2019b, 2019a). Hence, more

studies that investigate cognitive learning as a process that evolves across classroom preparation, outdoor activity, and follow-up work in the classroom seem to be needed in the Nordic countries as well as internationally.

The eight articles with *friluftsliv* as the subject matter context originate from Norway and Sweden, which can be ascribed to the explicit presence of *friluftsliv* in the Norwegian and Swedish curricula (Annerstedt, 2008). Hence, *friluftsliv* may be part of the nature of research on outdoor education at least in these two countries. However, these countries are becoming increasingly multicultural, which we believe challenges the notion and practice of *friluftsliv*—both within *friluftsliv* as an optional school program and as part of P.E. Recent research from Norway indicates that opportunities for *friluftsliv* as outdoor recreation are influenced by social and cultural class (Gurholt, Eriksen, & Torp, 2020; Skar, Vold, Gundersen, & O'Brien, 2016). From this, it can be proposed that factors such as culture, multi-culturalism, and diversity in school-based *friluftsliv* and other outdoor education be explored in further research.

There was only one study addressing mobile applications as a tool for outdoor learning in our review (Rikala, 2015), which may be surprising because education in the Nordic countries is highly digitalized, meaning that students have access to digital devices during the school day. While the international literature on digital tools in outdoor education is increasing (Hills & Thomas, 2020), it may represent an area for further research on outdoor education in Nordic school contexts because Nordic school culture has traditions of both outdoor education and the use of digital resources.

Finally, there are limitations of this scoping review. First, the present scoping review did not assess the quality of the methods and evidence in the studies, because quality assessments are not typically included in scoping reviews (Chang, 2018). Further research may go into detail on the quality of the methods and conclusions being drawn, similar to other systematic review studies on outdoor education (Becker et al., 2017; Mygind et al., 2019b). Second, the scoping review is limited by the 'exclusion' criteria in Table 1. Our scoping review focuses on school-based outdoor education, but there is also a body of research on informal *friluftsliv* and other learning in informal settings (e.g. museums) in the Nordic countries. There is also a large body of literature on outdoor education in Nordic countries published in books, book chapters and reports, which were excluded by our criterion 'peer reviewed journal articles.' Furthermore, this scoping review excluded empirical research on outdoor education in kindergarten and preschool, preschool combined with primary school, and higher education, including teacher education. It also excluded studies in which the outdoor education was conducted by educators other than school teachers, such as nature guides, educational researchers, museum educators, and other outdoor education experts. Hence, future review studies may consider including literature in areas compatible with the exclusion criteria in Table 1 to provide an even more complete overview of outdoor education conducted and practiced in Nordic countries.

To conclude, this scoping review has found that there is a considerable body of empirical research on outdoor education in grades 1–13 in Denmark, Sweden, and Norway and, to a lesser extent, Finland, published until July 2021. Certain perspectives appear to prevail, such as teachers' perspectives and nature of outdoor education, although there are some differences across the countries regarding methodological approach, school level, and subject matter contexts. These identified features allowed us to suggest areas for further research that can contribute to broadening , for instance, by including multicultural perspectives on outdoor education, researching learning processes across classroom and outdoor settings, and how digital tools can support outdoor education . There is also a need for future review studies that can evaluate the quality of the research on outdoor education and include research on outdoor education in higher education, kindergarten, and preschool, as well as outdoor education led by other than school teachers (e.g. nature guides and outdoor education experts).

## Note

1. In Norway, primary, secondary, and upper secondary spans over grades 1–13, whereas in the other Nordic countries, it spans over grades 1–12.

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No potential conflict of interest was reported by the author(s).

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## Appendix

Search string English 24.06.20

('outdoor education\*' or 'outdoor teaching\*' or 'outdoor learning\*' or 'excursion\*' or 'field trip\*' or 'fieldtrip\*' or 'fieldwork\*' or 'field work\*' or 'place-based education\*' or 'place-based learning' or 'place-based teaching\*' or 'out-of-classroom' or 'learning outside the classroom').mp. or Field Trips/ or Outdoor Education/) and (('primary school\*' or 'elementary school\*' or 'secondary school\*' or 'high school\*' or 'upper secondary school\*' or).mp. or secondary education.el. or high schools.el. or primary education.el. or elementary education.el. or elementary secondary education.el.) and ('norw\*' or 'Denmark\*' or 'danish' or 'Finland\*' or 'finnish' or 'swed\*' or 'Iceland\*' or 'icelandic' or 'nordic' or 'scandinavia\*')

Search string in Nordic languages 24.06.20

Uteundervisning OR uteskole OR utomhuspedagogik OR udeskole OR ekskursjon OR 'stedsbasert undervisning\*' OR 'stedsbasert læring\*' OR utomhusundervisning OR utomhusutbildning OR 'udendørs uddannelse\*' OR 'udendørs undervisning\*' OR «opiskella ulkona\*» OR «ulko-opetus» OR «úttikennsla» OR «útinám»