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**Title:** The role of the home in children's critical reading skills development

**Year:** 2024

**Version:** Published version



**Please cite the original version:**

Paakkari, L., Ruotsalainen, J., Lahti, H., Kulmala, M., Kendeou, P., Raittila, T.-L., Manu, M., Salminen, J., & Torppa, M. (2024). The role of the home in children's critical reading skills development. Humanities and Social Sciences Communications, 11, Article 326. https://doi.org/10.1057/s41599-024-02843-7

Humanities & Social Sciences Communications

ARTICLE

https://doi.org/10.1057/s41599-024-02843-7 OPEN

# The role of the home in children's critical reading skills development

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This study aimed to identify the specific home environment factors that were judged to support or hinder the development of children's critical reading skills. Using a Delphi method, 32 experts in Finland listed a set of home-related factors that can either hinder or support the development of children's critical reading skills. The experts then evaluated and ranked the factors according to their perceived importance. A large set of home-related factors was produced. Out of these, we identified 13 supportive and nine hindering factors. The factors highlighted the importance of having a space for the child to be heard and involved in family discussions, having a space for differing viewpoints and critical thinking, parental competencies to support critical reading skills, and positive parental attitudes towards schooling and learning. The findings can be used for measurement and intervention development purposes.

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## Introduction

Reading ability has long been seen as crucial for survival in the modern world. However, the demands on reading skills have become more complex in recent years due to the evolution and widespread dissemination of information, especially regarding digital ecosystems. The Internet offers opportunities for almost everyone to publish information, including heterogeneous information of varying quality (Strømsø and Kammerer, 2016). In 2020 in Europe, on average, 75% of young people aged 10–18 reported encountering online disinformation (Lobe et al. 2021). This indicates the requirement to master reading skills beyond merely decoding and comprehending texts to gain information (Kendeou et al. 2019; Paakkari et al. 2021). To be a proficient reader in the digital world, people need not only the ability 'to read, interpret, make meaning of and communicate through digital texts and sources from a variety of online media' but also the ability to 'evaluate critically and filter information' (Organization for Economic Co-operation and Development [OECD], 2019a, p. 5). In this process, there is a need for critical reading skills, here referring to the ability to take a critical stance while reading (Wallace, 2003). In practice, this means that a critical reader must analyse, interpret, and evaluate the text to understand not only what was written but also other aspects, including the expertise of the author and the purpose of the text (Din, 2020).

Previous research suggests that many children (note that in this paper, 'child' refers to both children and adolescents) lack necessary critical reading skills (e.g., Breakstone et al. 2021; Kiili et al. 2018). This is one of the main challenges of our time, encompassing the need to ensure equal opportunities for all persons to learn critical reading skills. Where are these skills learned? As with reading in general, schools are indispensable formal contexts for the learning of critical reading skills. However, in the current situation of a rapidly changing information environment, informal learning environments within the home also have an important role in children's learning of critical reading skills. In fact, as applied to critical reading skills (as opposed to basic reading skills), interest in the role of the home has only accumulated fairly recently, and research on the factors influencing the development of these skills within the home is scant. This information is needed to guide future research, for instance, regarding questionnaires for evaluating the home characteristics conducive to critical reading skills.

Homes offer unique possibilities to support reading development, given that the relevant exposure can start early and span several years, yielding a massive exposure overall. Furthermore, the exposure can be flexibly timed, individually targeted, and child-initiated, adding up to a stronger impact than instruction in the classroom setting. Because support at home is delivered by close family members, it may also be easier to create reciprocal interaction, to ask questions, and to provide emotional support during learning within a safe environment. Although much is already known about the role of the home in reading accuracy, fluency, and comprehension development (see Flack et al. 2018; Sénéchal and LeFevre, 2002), few studies have specifically examined the associations between home characteristics and critical reading skills. Furthermore, these associations may differ from those found via traditional reading comprehension measures (Cho et al. 2021). Given the unique aspects of critical reading skills and the processes required of the reader (e.g., navigation, evaluation, and integration; see van den Broek and Kendeou, 2017), it seems likely that the skills in question may be promoted at least partially by specific home characteristics or activities within the home.

As noted above, there is only limited information on critical reading skills development and the characteristics of the home. However, the findings of studies on how the home literacy environment supports reading accuracy, fluency, and comprehension remain relevant given that critical reading skills are at least partially based on basic reading skills (Cho et al. 2021; Kanniainen et al. 2019). Multiple home characteristics have been shown to correlate with children's basic reading development, including parental education, parental attitudes and reading activity, parental reading difficulties, shared reading with children, teaching literacy skills at home, and providing access to books and other print materials (Inoue et al. 2020; Sénéchal and LeFevre, 2002; Torppa et al. 2022).

Of the various home characteristics, the strongest effects on children's reading skills have been found to derive from active interaction between parents and children encompassing, for example, parent-child shared reading and the teaching of literacy skills (Sénéchal and LeFevre, 2002; Wasik and Bond, 2001). Teaching activities have been found to promote, in particular, the learning of letter names and decoding, while shared reading activities have been found to promote vocabulary and reading comprehension (Manolitsis et al. 2011; Sénéchal and LeFevre, 2002; Torppa et al. 2022). Parental language during shared reading interactions has been shown to be more sophisticated (in terms of vocabulary diversity and syntactic complexity) than outside book reading interaction, making this activity particularly important for comprehension development (Demir-Lira et al. 2019). In addition to the parent-child interaction around written language, everyday parent-child discussions may offer opportunities for engaging in reasoning and drawing inferences, and this can serve as a foundation for further critical thinking skills development (Murphy et al. 2014). Overall, given that critical reading skills require basic linguistic and reading skills, one can anticipate that shared literacy activities at home benefit critical reading skills development.

Few studies have examined the relationship between the characteristics of the home environment and reading measures containing items that specifically tap critical reading skills. Such measures include the Progress in International Reading Literacy Study (PIRLS), which evaluates reading skills via items that are designed not only to require information retrieval and the formation of straightforward inferences but also the integration of ideas and information to evaluate and reflect on the content. The findings on the associations between PIRLS scores and home environment factors have been mixed. In the Netherlands, Netten et al. (2014) reported that better PIRLS scores among 10-year-old children were predicted by the mother's higher education, a higher number of books at home, a higher number of literacy activities, and less computer use. Guzmán-Simón et al. (2020) found that among 9 to 10-year-old Spanish children, parental education, parental occupation, and the number of books at home were associated with PIRLS scores. However, Morales Silva et al. (2011) suggested that among children aged on average 11 years in Peru, there were no associations between the home literacy environment (the number of literacy activities and books at home) and children's PIRLS scores, but parental socioeconomic status did show such an association. Similarly, Yang et al. (2018) found no associations between PIRLS scores and parental involvement in a sample from Abu Dhabi. In the context of PIRLS, the associations thus seem to vary across countries, as confirmed in a comparative study of 23 European countries by Crespo et al. (2019). They reported that in some countries PIRLS scores were associated with parental interest in reading and/or the number of early literacy activities at home. However, often no such association was evident.

The Programme for International Student Assessment (PISA) may also be seen as an assessment of critical reading skills

(OECD, 2019b). It requires not only retrieval of facts from texts but also the integration of information across different parts of the reading material (texts, figures, diagrams, and tables) as well as reflection on and evaluation of the materials (including awareness of the author's motives or purposes). In the context of the PISA, Ahonen (2021) reported correlations between 15-year-old adolescents' reading scores and reports of the home's socio-economic status, including the parents' educational level. In addition to concurrent correlations, a recent longitudinal study by Torppa et al. (2022) examined the role of parent-child shared reading and literacy teaching in children's language and literacy development from ages 2 to 15 using PISA reading assessments as the final outcome. The results suggested that shared parent-child activities at home (shared book reading and teaching reading) have a longstanding impact on reading development by supporting the development of children's language and literacy skills and reading motivation.

Further evidence linking the home environment and critical reading skills comes from a study by Taylor et al. (2017), who found that the Florida Comprehensive Assessment Test (FCAT) score was associated with students' home environment measure. In a similar manner to the PIRLS and PISA, the FCAT seems to come closer to the conceptualisation of critical reading than is the case for many other reading comprehension assessments because it requires not only the retrieval of facts from the text but also the integration of information from different parts of the reading material, identification of ideas, and analysis of the author's intent. Note, however, that in Taylor et al.'s (2017) study, the home environment index was formed via a broad composite including parental education, the amount of time the child spent reading, household income, the amount of parental assistance with English grammar, child-rated confusion at home, and the amount of time spent watching TV. It is therefore difficult to draw conclusions on which aspects of the home were important or on the mechanism explaining the association.

Previous studies on the associations between home factors and critical reading skills have assessed the home environment via parent or child questionnaires that tap into traditional home literacy environment characteristics, including exposure to print, parent-child shared reading, or the teaching of literacy skills. It is, however, likely that these aspects alone will provide an incomplete picture, implying a need to identify the more specific home-related factors applicable to critical reading skills. With this research gap in mind, the present study aimed to identify the specific home environment factors that were judged to support or hinder the development of children's critical reading skills. Identification of the relevant home characteristics has the potential to facilitate future research incorporating measures of home environment characteristics. To this end, we used the Delphi method, which collects the views of experts on the matter.

## Methods

This study sought to answer the following research question: What are the specific home environment factors that experts judged to support or hinder the development of children's critical reading skills? The Delphi method was used as a means of addressing the research question. This is a method by which quantitative and qualitative procedures are combined to achieve convergence of an opinion on a phenomenon from a sample of selected experts (Crutzen et al. 2008; McMillan et al. 2016). The Delphi method is particularly valuable when the available knowledge on a topic is scarce (Niederberger and Spranger, 2020), as in our case. There are different ways of conducting a Delphi study. In our Delphi approach, a three-round survey process (de Meyrick, 2003) was employed over 12 weeks, initially with 32 experts in Finland. In Delphi studies, sample sizes vary, ranging from 11 to 25 persons (Diamond et al. 2014). Hence, as in the case of the present study, Delphi studies do not aim at results that are generalisable to a larger population. To avoid group influence on individual responses and subjectivity to social desirability bias, anonymity was ensured (Grime and Wright, 2016), and there were no feedback discussions between rounds (Barrios et al. 2021).

**Participants**. Purposeful sampling was used to identify and pre-select information-rich cases (i.e., participants) (see Patton, 2002). Specifically, maximum variation sampling (Suri, 2011) was adopted, as, in a Delphi study, the participants should provide diverse expert perspectives on the phenomenon in question (Okoli and Pawlowski, 2004). The experts were identified using Okoli and Pawlowski's (2004) procedure. First, the researchers identified the relevant disciplines, organisations, professions, and skills from the perspective of critical reading. Next, the names of potential participants were identified from the websites of the organisations or based on the publications of the experts. Then, the researchers were ranked in the research group, and a panel structure was formed with the aim of including participants who could provide multiple viewpoints on the topic. Finally, the selected experts were invited and asked to suggest a potential alternative participant if they could not participate. In total, 35 experts were identified and invited. Three could not be reached, and two suggested participation by another expert within their organisation.

In the end, the survey was sent to 32 experts. The participants came from Finland and had professional knowledge of and experience with critical reading skills from various domains, including childhood and family studies, immigrant backgrounds, educational policy, pedagogy, media education, media literacy, special education, learning difficulties, social work, and culture. They worked as teachers, researchers, or experts in governmental bodies or societal NGOs in the following fields: social and health services, culture, education, and higher education, expert in some other organization, or other (Table 1).

Prior to data collection, the participating experts were called by phone to explain the purpose of the survey and to request participation. They also received information and a data privacy notice on the project via email. The data were collected using electronic questionnaires (i.e., Webropol), and a link to the questionnaire was emailed to the participants in each round. As

**Table 1 Participant demographics.**

| | Round 1 $N = 32$ (%) | Round 2 $N = 27$ (%) | Round 3 $N = 27$ (%) |
|---|---|---|---|
| **Gender** | | | |
| Female | 75.0 | 74.1 | 74.1 |
| Male | 25.0 | 25.9 | 25.9 |
| **Age** | | | |
| 30–39 | 25.0 | 29.6 | 25.9 |
| 40–49 | 28.1 | 37.0 | 37.0 |
| 50–59 | 34.4 | 25.9 | 25.9 |
| 60 or older | 12.5 | 7.4 | 11.1 |
| **Field of occupation** | | | |
| Social and health services | 9.4 | 11.1 | 18.5 |
| Culture | 18.8 | 18.5 | 14.8 |
| Education | 9.4 | 7.4 | 7.4 |
| Higher education | 43.8 | 37.0 | 40.7 |
| Expert in some other organization | 15.6 | 18.5 | 14.8 |
| Other | 3.1 | 7.4 | 3.7 |

anonymity is a key component in a Delphi study process, the link was sent to the selected group without the possibility that an answer could be traced to a specific individual. Similarly, as the experts could not view each other's answers, the intention was to facilitate the experts' own views on the topic. All three rounds included questions regarding consent to participate, plus questions on general demographics (gender, age group, and field of expertise).

### Delphi procedure

*The first round*. The purpose of the first round was to encourage experts to freely express ideas on the research phenomena and to generate questionnaire items for the second round (Hasson et al. 2000). Prior to administration with the experts, the first-round online questionnaire was piloted with three people who were neither part of the research team nor experts. It included two open-ended questions in which the experts were asked to list family factors that (i) support children's critical reading skills development and (ii) may hinder these skills. The respondents were provided with the following definition of critical reading skills: 'By critical reading skills, we mean the ability to analyse, interpret, and evaluate what is read or seen in different formats and environments, including the Internet'.

The responses provided by the experts in the first round were read through carefully by five research team members. We identified the different supportive and hindering factors and removed the overlapping mentions. As a final step, we (re) formulated the responses as statements. During the reading, team members served as critical friends for each other. The process could be characterised as a 'critical dialogue between people, with researchers giving voice to their interpretations in relation to other people who listen and offer critical feedback' (Smith and McGannon, 2018, p. 113), with the different perspectives of the team members being 'positioned as a resource for challenging and developing the interpretations' (Smith and McGannon, 2018, p. 113). Here, the aim was to ensure loyalty to the data while identifying and formulating the statements. A questionnaire with the final set of items to be rated on a Likert scale was then formed for the second round. The supportive factors and hindering factors were listed separately. Within each list, the items were presented in random order. In building the items for the second round, the wording used by the participants was followed as closely as possible (Hasson et al. 2000).

*The second round*. In the second round, the experts were asked to evaluate the importance of each item using a 7-point Likert scale in an online questionnaire. The scale for the supportive factors ranged from 1 = not at all important to 7 = very important. The scale for the hindering factors ranged from 1 = not at all hindering to 7 = strongly hindering. The data were checked for straight-line responses (i.e., the same response given for all items) and missing information. There were no instances of either of these.

The experts' responses were analysed quantitatively to identify the most important items according to the experts' opinions. The modes, means, medians, standard deviations, and Z-scores (standardised scores with sample mean = 0, standard deviation = 1) were computed to determine the most important factors according to the experts' opinions. The items that emerged as most important were listed and used to construct a new questionnaire for the final round.

Agreement among respondents was examined using various techniques (see Diamond et al. 2014), bearing in mind that there is no single accepted standard for determining the point at which consensus is reached in Delphi studies. In the present study, the method of choice for determining the consensus was an examination of the agreement percentages among respondents. First, a calculation was made of the number of agreeing pairs of respondents divided by the number of all possible pairs of respondents in the data set. In addition, the proportion of respondents who rated an item as among at least x important (abbreviated henceforth as *agree* $\% \geq x$) was determined for different values of x. These varying techniques were chosen to gain a more thorough understanding of the level of consensus among the respondents.

For the subsequent third round, we selected items with half a standard deviation above the average importance rating ($Z \geq 0.5$) and with medians and modes ≥ 6. The decision was based on the need to have a reasonable number of items deemed of high importance for rating and selection in the third round. According to our consideration of the matter, a more lenient cut-off would have yielded too many items, whereas a more stringent cut-off would have overly limited the pool of items. The cut-off was arbitrary, as there are no generally valid cut-off guidelines in the literature (Löfmark and Mårtensson, 2017).

*The third round*. In the third round, the experts were asked to complete an online questionnaire to select and rank the 10 most important supportive family factors and the 10 most important hindering family factors affecting critical reading development in the home. The most important item received 10 points from each respondent, and the 10th most important received 1 point. Items outside the list of the ten most important items were given a value of 0. The sum scores and Z-scores of the experts' responses were then analysed to determine the most important factors according to the experts' opinion. To identify the most important factors in this round, a Z-score of 0 was used as a cut-off value. This cut-off meant that the items selected received an above-average score in this round. It should be noted that this cut-off—as with previous cut-off values—was arbitrary. Agreement among the respondents in the third round was examined following the same procedure as in the second round.

## Results

**The first round**. All 32 experts participated in the first round (response rate: 100%). They produced a detailed list of 195 supportive and 175 hindering factors. After the removal of overlapping factors, 69 supportive and 68 hindering factors were identified and (re)formulated as statements for the second round.

**The second round**. Of the original 32 experts, 27 participated in the second round, yielding an 84.38% response rate. On average, the experts evaluated most of the items as important factors in the development of children's critical reading skills.

The selected cut-off yielded 26 supportive factors (Table 2) and 23 hindering factors (Table 3). The agreement percentages for these items (calculated by dividing the number of agreeing pairs of respondents by the number of all possible pairs of respondents in the dataset) varied between 0.30 and 0.54.

**The third round**. In the final round, 27 of the original 32 experts responded to the questionnaire invitation, yielding an 84.38% response rate. In this round, the participants selected and ranked the 10 most important supportive and 10 most hindering factors among the 26 supportive and 23 hindering factors that remained after the second round. The results (Tables 2 and 3) showed that the responses varied across the items and that (considering the respondents overall) all the items received a mention in the lists of the 10 most important items. The variability in expert agreement seemed to be somewhat larger for the supportive items than

**Table 2 The Most Important Supportive Factors Based on the Second and Third Delphi Rounds.**

| | Round 2 | | | | | Round 3 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Median | Mode | Z-score | Agree % | Agree % = 7 | Sum-score | Z-score | Agree % | Agree % = 10 | Agree % ≥ 6 | Agree % ≥1 |
| 1. In family discussions, the child is given the possibility to reflect, ask, and be heard. | 7 | 7 | 1.67 | 52 | 70.4 | 90 | 1.77 | 31 | 3.7 | 29.6 | 63.0 |
| 2. Parents are willing to support the development of the child's critical literacy. | 7 | 7 | 1.56 | 47 | 63.0 | 87 | 1.61 | 33 | 3.7 | 33.3 | 55.6 |
| 3. Reflecting on different viewpoints is part of the discussion carried out in the family. | 6 | 6 | 0.65 | 35 | 40.7 | 80 | 1.23 | 39 | 7.4 | 25.9 | 44.4 |
| 4. Parents are present and interested in the world of the child. | 6 | 7 | 0.76 | 37 | 48.1 | 76 | 1.01 | 39 | 14.8 | 25.9 | 44.4 |
| 5. The family climate allows for opinions and tolerates disagreements. | 7 | 7 | 0.76 | 39 | 59.3 | 75 | 0.96 | 40 | 11.1 | 29.6 | 44.4 |
| 6. Parents have the knowledge and practical skills to support critical literacy. | 6 | 6 | 0.76 | 38 | 44.4 | 75 | 0.96 | 39 | 7.4 | 25.9 | 44.4 |
| 7. Parents are interested in the child's use of the media. | 7 | 7 | 0.76 | 36 | 51.9 | 74 | 0.91 | 40 | 0.0 | 29.6 | 44.4 |
| 8. Things that are important to the child are discussed with the child. | 7 | 7 | 1.22 | 40 | 55.6 | 74 | 0.91 | 36 | 3.7 | 25.9 | 48.1 |
| 9. Parents find media literacy valuable. | 7 | 7 | 0.99 | 37 | 51.9 | 68 | 0.58 | 41 | 7.4 | 22.2 | 40.7 |
| 10. Information is sought on the interests of the child, and it is examined together with the child. | 7 | 7 | 0.65 | 35 | 51.9 | 67 | 0.53 | 43 | 0.0 | 29.6 | 40.7 |
| 11. The reliability of information and sources is discussed in the family. | 7 | 7 | 1.56 | 48 | 66.7 | 65 | 0.42 | 39 | 3.7 | 18.5 | 44.4 |
| 12. The family encourages the child to talk about and discuss content encountered in the media. | 7 | 7 | 1.33 | 42 | 59.3 | 61 | 0.21 | 41 | 3.7 | 22.2 | 40.7 |
| 13. The family climate encourages participation in discussion. | 7 | 7 | 0.76 | 36 | 51.9 | 58 | 0.05 | 48 | 3.7 | 18.5 | 33.3 |
| 14. The child is taught to use the media responsibly and safely. | 6 | 7 | 0.76 | 36 | 48.1 | 54 | −0.17 | 45 | 7.4 | 14.8 | 37.0 |
| 15. The parents' thinking is flexible and nuanced (as opposed to black-and-white thinking). | 7 | 7 | 0.65 | 35 | 51.9 | 52 | −0.27 | 44 | 3.7 | 18.5 | 37.0 |
| 16. The child is encouraged to express opinions. | 7 | 7 | 0.99 | 39 | 55.6 | 51 | −0.33 | 45 | 0.0 | 14.8 | 37.0 |
| 17. There is a positive attitude towards education and studying in the home. | 6 | 6 | 0.99 | 42 | 40.7 | 49 | −0.44 | 45 | 3.7 | 14.8 | 37.0 |
| 18. The family discusses together how different content (incl. videos and photos) can be edited to mislead someone. | 6 | 7 | 0.65 | 33 | 44.4 | 48 | −0.49 | 48 | 0.0 | 18.5 | 33.3 |
| 19. What has been read is discussed with the child. | 7 | 7 | 1.22 | 40 | 55.6 | 42 | −0.81 | 52 | 3.7 | 14.8 | 29.6 |
| 20. Parents are used to questioning information and reflecting on its origin. | 7 | 7 | 0.99 | 38 | 55.6 | 42 | −0.81 | 52 | 7.4 | 11.1 | 29.6 |
| 21. Topical issues are discussed with the child. | 6 | 7 | 0.65 | 34 | 48.1 | 39 | −0.97 | 48 | 0.0 | 14.8 | 33.3 |
| 22. The child can ask about puzzling things at home. | 7 | 7 | 1.44 | 45 | 63.0 | 36 | −1.13 | 50 | 0.0 | 7.4 | 33.3 |
| 23. The child is asked to justify opinions. | 6 | 7 | 1.33 | 44 | 48.1 | 33 | −1.3 | 57 | 0.0 | 7.4 | 25.9 |
| 24. Parents have an open and understanding way of thinking. | 7 | 7 | 0.54 | 34 | 51.9 | 31 | −1.4 | 58 | 0.0 | 3.7 | 25.9 |
| 25. The family examines information and sources critically but respectfully. | 6 | 7 | 0.76 | 34 | 44.4 | 31 | −1.4 | 57 | 3.7 | 11.1 | 25.9 |
| 26. Cause–effect relationships are discussed with the child. | 6 | 6 | 0.76 | 36 | 40.7 | 27 | −1.62 | 57 | 0.0 | 11.1 | 25.9 |

The *Agree* percentages (except for *agree % ≥ 6* and *agree % ≥ 1*) were calculated by dividing the number of agreeing pairs by the number of all possible pairs in the dataset. The agree % for the 2nd round is the agreement percentage for exactly the same response. Round 2 agree % = 7 is the proportion of respondents who gave the item score a rating of 7. The agree % for the 3rd round is the pairwise agreement percentage for an item being in the top 5 items vs the other items. Round 3 agree % = 10 is the proportion of respondents who gave the item score a rating of 10. Round 3 agree % ≥ 6 is the proportion of respondents who rated the item score among the top 5 items. Round 3 agree % ≥ 1 is the proportion of respondents who rated the item score among the top 10 items.

**Table 3 The Most Important Hindering Factors Based on the Second and Third Delphi Rounds.**

| | Round 2 | | | | | Round 3 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Median** | **Mode** | **Z-score** | **Agree %** | **Agree % = 7** | **Sum-score** | **Z-score** | **Agree %** | **Agree % = 10** | **Agree % ≥6** | **Agree % ≥ 1** |
| 1. The family is not interested in the child's thoughts and questions. | 7 | 7 | 1.36 | 42 | 59.3 | 139 | 2.29 | 42 | 29.6 | 51.9 | 59.3 |
| 2. The family follows strong ideologies that do not allow for different views or ideas. | 7 | 7 | 1.51 | 46 | 55.6 | 130 | 2.01 | 33 | 18.5 | 44.4 | 70.4 |
| 3. The family has beliefs that prevent critical thinking and calling things into question. | 6 | 6 | 1.36 | 44 | 48.1 | 106 | 1.28 | 31 | 3.7 | 33.3 | 70.4 |
| 4. The child is left alone with media content. | 7 | 7 | 0.86 | 33 | 51.9 | 98 | 1.03 | 32 | 3.7 | 37.0 | 63.0 |
| 5. Parents try to reduce trust in expert knowledge. | 7 | 7 | 1.22 | 39 | 51.9 | 87 | 0.69 | 41 | 11.1 | 33.3 | 44.4 |
| 6. The family has a negative attitude towards studying and school. | 7 | 7 | 1.15 | 37 | 51.9 | 82 | 0.54 | 34 | 0.0 | 37.0 | 55.6 |
| 7. Parents have an uncritical attitude towards information sources. | 7 | 7 | 1.44 | 45 | 51.9 | 82 | 0.54 | 34 | 3.7 | 29.6 | 51.9 |
| 8. The family has a negative attitude towards learning. | 7 | 7 | 1.73 | 53 | 70.4 | 79 | 0.44 | 34 | 3.7 | 22.2 | 51.9 |
| 9. The family is not used to discussing at home. | 6 | 7 | 0.86 | 32 | 44.4 | 74 | 0.29 | 36 | 7.4 | 22.2 | 48.1 |
| 10. The child is not encouraged to form and justify opinions. | 6 | 6 | 0.86 | 36 | 37.0 | 63 | −0.05 | 45 | 3.7 | 22.2 | 37.0 |
| 11. The family has a negative attitude towards reading. | 7 | 7 | 1.44 | 47 | 63.0 | 63 | −0.05 | 38 | 3.7 | 22.2 | 44.4 |
| 12. Parents have a low interest in knowledge. | 6 | 6 | 0.64 | 34 | 33.3 | 61 | −0.11 | 45 | 3.7 | 22.2 | 37.0 |
| 13. Things that are important to the child are not discussed with the child. | 7 | 7 | 0.93 | 36 | 55.6 | 58 | −0.2 | 46 | 3.7 | 25.9 | 37.0 |
| 14. The child's opinions are neither asked nor heard. | 7 | 7 | 1.00 | 36 | 51.9 | 50 | −0.45 | 53 | 0.0 | 22.2 | 29.6 |
| 15. Parents' own critical literacy is poor. | 6 | 6 | 0.5 | 32 | 37.0 | 48 | −0.51 | 42 | 3.7 | 14.8 | 40.7 |
| 16. Parents have a dismissive attitude towards scientific information. | 6 | 7 | 1.22 | 39 | 48.1 | 48 | −0.51 | 42 | 0.0 | 14.8 | 40.7 |
| 17. Parents do not find critical literacy important. | 7 | 7 | 1 | 35 | 51.9 | 46 | −0.57 | 47 | 0.0 | 3.7 | 40.7 |
| 18. The child is not included in discussions. | 6 | 6 | 0.5 | 30 | 40.7 | 38 | −0.82 | 50 | 0.0 | 7.4 | 33.3 |
| 19. Parents are not willing to support the development of the child's critical literacy. | 6 | 7 | 0.93 | 34 | 48.1 | 31 | −1.03 | 57 | 0.0 | 11.1 | 25.9 |
| 20. The reliability of information is not discussed with the child. | 6 | 6 | 0.79 | 33 | 37.0 | 31 | −1.03 | 49 | 0.0 | 11.1 | 33.3 |
| 21. Topical issues are not discussed with the child. | 6 | 7 | 0.64 | 29 | 40.7 | 26 | −1.19 | 58 | 0.0 | 3.7 | 25.9 |
| 22. Parents have a low interest in texts/reading. | 6 | 6 | 0.5 | 31 | 29.6 | 25 | −1.22 | 47 | 0.0 | 3.7 | 40.7 |
| 23. What has been read is not discussed with the child. | 6 | 7 | 0.57 | 29 | 37.0 | 20 | −1.37 | 68 | 0.0 | 3.7 | 18.5 |

The *Agree* percentages (except for *agree % ≥ 6* and *agree % ≥ 1*) were calculated by dividing the number of agreeing pairs by the number of all possible pairs in the dataset. The agree % for the 2nd round is the agreement percentage for exactly the same response. Round 2 agree % = 7 is the proportion of respondents who gave the item score a rating of 7. The agree % for the 3rd round is the pairwise agreement percentage of an item being in the top 5 items vs the other items. Round 3 agree % = 10 is the proportion of respondents who gave the item score a rating of 10. Round 3 agree % ≥ 6 is the proportion of respondents who rated the item score among the top 5 items. Round 3 agree % ≥1 is the is the proportion of respondents who rated the item score among the top 10 items.

for the hindering factors; thus, the sum score for the most important supportive factor was 90, and for the most hindering factor it was 139. Moreover, the agreement percentages showed less agreement for the supportive factors; for example, only two supportive factors were selected by more than half of the experts as belonging to the top 10, while the corresponding number for the hindering factors was seven. Similarly, the most important supportive factor was agreed on by 31% of the experts, while the corresponding hindering factor was agreed on by 42%.

The selected cut-off yielded 13 most important supportive and nine most important hindering factors. Hence, Tables 2 and 3 report the sum scores and Z-scores for all the items included in the third round. Based on the collective judgment of the expert panel, the most important supportive factor was 'In family discussions, the child is given the possibility to reflect, ask, and be heard' (sum = 90, $Z = 1.77$). This was followed by (in order) 'Parents are willing to support the development of the child's critical literacy' (sum = 87, $Z = 1.61$)., 'Reflecting on different viewpoints is part of the discussion carried out in the family' (sum = 80, $Z = 1.23$), 'Parents are present and interested in the world of the child'(sum = 76, $Z = 1.01$), 'The family climate allows for opinions and tolerates disagreements'(sum = 75, $Z = 0.96$), 'Parents have the knowledge and practical skills to support critical literacy' (sum = 75, $Z = 0.96$), 'Parents are interested in the child's use of the media' (sum = 74, $Z = 0.91$), 'Things that are important to the child are discussed with the child' (sum = 74, $Z = 0.91$), 'Parents find media literacy valuable' (sum = 68, $Z = 0.58$), 'Information is sought on the interests of the child, and it is examined together with the child' (sum = 67, $Z = 0.53$), 'The reliability of information and sources is discussed in the family' (sum = 65, $Z = 0.42$), 'The family encourages the child to talk about and discuss content encountered in the media' (sum = 61, $Z = 0.21$), and 'The family climate encourages participation in discussion' (sum = 58, $Z = 0.05$).

The most important hindering factor was 'The family is not interested in the child's thoughts and questions' (sum = 139, $Z = 2.29$). The next eight were (in order) 'The family follows strong ideologies that do not allow for different views or ideas' (sum = 130, $Z = 2.01$), 'The family has beliefs that prevent critical thinking and calling things into question' (sum = 106, $Z = 1.28$), 'The child is left alone with media content' (sum = 98, $Z = 1.03$), 'Parents try to reduce trust in expert knowledge'(sum = 87, $Z = 0.69$), 'The family has a negative attitude towards studying and school' (sum = 82, $Z = 0.54$), 'Parents have an uncritical attitude towards information sources' (sum = 82, $Z = 0.54$), 'The family has a negative attitude towards learning' (sum = 79, $Z = 0.44$), and 'The family is not used to discussing at home' (sum = 74, $Z = 0.29$).

## Discussion

This Delphi study aimed to identify experts' views on the home environmental factors that support or hinder the development of critical reading skills among children. The experts produced an abundant collection of home environment factors relevant to critical reading skills, out of which the 13 most important supportive and nine most important hindering factors were identified.

The experts listed several parent-child activities that were seen as relevant for critical reading development. Overall, many listed activities went beyond the reading act itself; hence, they included more than just the shared parent-child activities that have previously been shown to be associated with basic reading skills, such as teaching reading skills and parent-child shared book reading (Flack et al. 2018; Sénéchal and LeFevre, 2002; Torppa et al. 2022). The parent-child activities were further extended to include shared activities that can be seen as directly associated with critical reading skills, such as examination of the credibility of information. This finding may reflect the overall consensus of the experts that the factors in the home environment contributing to a child's critical reading skills are more varied than those contributing to basic reading skills.

In addition to the joint parent-child activities, several factors encompassed the importance of having a space for the child to be heard and involved in family discussions, such as 'In the family discussions, the child is given the possibility to reflect, ask and be heard' and 'Things that are important to the child are discussed with the child' or, in contrast, 'The family is not interested in the child's thoughts and questions'. These findings suggest that parent-child discussions are an important context for informal learning experiences. Furthermore, as has been suggested by earlier research, parent-child discussions are a means to support the learning of complex topics (Tare et al. 2011) and critical thinking (Murphy et al. 2014). In discussions, written material may provide additional information and support for parents when explaining challenging topics (Tare et al. 2011); however, this aspect was not brought up by the Delphi experts. Tare et al. (2011) also noted similarities between school inquiry activities and the everyday explanatory conversations among families. In line with our findings, critical thinking is especially supported if the discussions focus on topics with personal relevance for the child (Wan, 2022). In addition to discussions on the topics children are interested in, the Delphi experts brought up the importance of parents' interest in the child's use of media, and of parents' willingness to encourage a child to talk about content encountered in the media. The media, especially digital media environments, form important growth and learning contexts for children and adolescents. Parents seem to be quite active in supporting their children regarding online content; according to the EU Kids Online 2020 report, 64% of European children ages 9–16 reported receiving help from their parents when something on the Internet bothered them (Smahel et al. 2020). However, according to the same survey, two-fifths of children reported that their parents hardly ever or never talked with them about what they do on the Internet.

The experts also produced multiple supportive and hindering factors that reflected the need for a space for different viewpoints and critical thinking in the family. The responses underlined the importance of family discussions that included allowing and reflecting on different viewpoints and assessing the credibility of information for critical reading development. Hence, creating opportunities for critical thinking in families involves an atmosphere that welcomes the different opinions of all family members, including those of children. Nevertheless, some families may actively seek to reduce trust in expert knowledge due to strong ideologies encompassing opposition to critical thinking or content that calls matters into question—a point mentioned by the experts. Here, an important aspect is how parents relate to knowledge and knowing, a feature that has been found to determine how children come to evaluate and build knowledge (Goldman et al. 2021). If people espouse beliefs that knowledge is simple, certain and stable, they will tend to select reading only a single text; moreover, the texts in question will be in line with their existing understanding of the content, with no comparison of different sources and perspectives and no assessment of the credibility of selected texts (Strømsø and Kammerer, 2016). In contrast, if people espouse the notion that knowledge is complex, uncertain, and unstable, they will tend to seek differing viewpoints from different sources and evaluate the quality of the information (Strømsø and Kammerer, 2016). In the former situation, digital environments pose an additional challenge insofar as the algorithms of different sites or services may create a

biased understanding and polarised views of a phenomenon (involving filter/epistemic bubbles or echo chambers; Kendeou et al. 2020; Nguyen, 2020). Hence, digital spaces may not increase but limit exposure to diverse opinions and perspectives, even though family and trusted friend networks have been suggested to be even more segregated than online networks (Gentzkow and Shapiro, 2011).

As with digital networks, families may form a kind of social epistemic structure (i.e., an echo chamber), which actively excludes or discredits different voices and keeps their members dependent on the information they provide (see Nguyen, 2020). This may be of special concern if people are misinformed. For example, in recent years, misinformation on the COVID-19 virus has been a major threat to public health (Lewandowsky et al. 2021). Schooling, and education in general, may serve as a critical factor in supporting the epistemic rebooting among children that is needed to challenge such a social epistemic structure (see Nguyen, 2020). In line with Goldman et al.'s (2021) statement regarding learning science at home, we propose that 'family dynamics around epistemic practices need airing and addressing' (p. 638). This also applies to supporting children's critical reading skills development.

The experts also emphasised parental skills and attitudes as key supportive factors to support children's critical reading skills. However, some parents may themselves lack these skills. In this case, the role of the school and other contexts for critical reading development are particularly important. At the same time, it is possible that a parental lack of critical reading skills, particularly if combined with negative attitudes towards school and learning, will not only affect the support children receive at home but also challenge the collaboration between homes and schools. More research is required to determine what type of collaboration—or co-occurrence of actions—between homes and schools would be optimal for children's critical reading skills development. One possible way to enhance home-school collaboration is to increase trust between the two parties—a factor associated with parental school involvement (Penttinen et al. 2020) and student achievement (Goddard et al. 2001). Nevertheless, collaboration will not be possible if there is no communication between the two parties. Thus, an open and appreciative relationship between homes and schools is crucial.

One central feature that ran through many of the experts' responses on the importance of active interactions between parents and children in learning critical reading skills was similar to earlier findings regarding the home environment characteristics that affect children's basic reading skill development (see Manolitsis et al. 2011; Sénéchal and LeFevre, 2002; Torppa et al. 2022). In the learning of basic reading skills (decoding and reading comprehension), interactions between the parent and the child involving shared reading have been seen as relevant to the learning of decoding skills. However, in the present study, further emphasis was placed on the role of family discussions, the teaching of media skills, and analysing the source of information.

Child-parent interactions were reflected in several factors. One set of factors emphasised the importance of discussion with children as active participants (e.g., 'In family discussions, the child is given the possibility to reflect, ask and be heard' and 'Things that are important to the child are discussed with the child'). Yet another set of factors characterised parents as teaching children skills and knowledge regarding critical reading, including online texts: 'Information is sought on the interests of the child, and it is examined together with the child', 'The reliability of information and sources is discussed in the family', and 'The family encourages telling about and discussing content encountered in the media'.

Overall, the results suggest multiple supportive and hindering factors that should be considered when the aim is to support children's critical reading skills in the home. These findings on the supportive and hindering factors are important in terms of building an understanding of the target phenomenon and raising issues for debate. Furthermore, the identified factors can be used to develop measures in future studies and for intervention purposes to support critical reading development in the home. It remains to be seen whether these factors are associated with differences in children's critical reading skills or whether increasing or decreasing such factors in the home will affect critical reading skills development.

As in any study, several limitations should be noted. As this study focused only on expert opinion in one country, Finland, additional research is needed to understand the phenomenon in other countries. Finland represents a so-called WEIRD society (Western, Educated, Industrialized, Rich, and Democratic; see Henrich et al. 2010), and this context may yield different results from other contexts. It is possible, for example, that family affluence or other material aspects that are often associated with reading skills (Guzmán-Simón et al. 2020; Morales Silva et al. 2011; Netten et al. 2014) would be seen as more important in other geographical and cultural contexts. Furthermore, a selection of experts from different academic and practical fields from those selected in this study—and further, interviews with parents or children—could produce additional or differing supportive and hindering factors. Note also that a different study design could allow us to identify those factors that are typical for critical reading skills development within and across different settings and factors that are common to reading development in general.

## Data availability

The datasets generated and/or analysed during the current study are available from the corresponding author upon reasonable request.

Received: 18 November 2022; Accepted: 19 February 2024;
Published online: 28 February 2024

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## Acknowledgements

The project was funded by the Strategic Research Council (SRC) established within the Research Council of Finland (Grants 335625, 335727, 358490, and 358250), the Ministry of Social Affairs and Health, and Juho Vainio Foundation, as well by the Guy Bond Chair in Reading and Distinguished McKnight Professorship to P Kendeou.

## Author contributions

Corresponding author (LP), Study conception and design (LP, HL, MK, MM, JS, MT), Data collection, analysis and interpretation of result (LP, JR, HL, MK, TLR, MM, JS, MT), Draft manuscript preparation (all authors). All authors reviewed the results and approved the final version of the manuscript.

## Competing interests

The authors declare no competing interests.

## Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The research followed the Finnish National Board on Research Integrity TENK guidelines 2019, and according to the guidelines, there was no need for the ethical review statement from a human sciences ethics committee.

## Informed consent

Informed consent to participate in the study was obtained from participants each data collection round (informed consent was asked on the first page of each online questionnaire).

## Additional information

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