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How accessible is primary eyecare for children in England?

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Running head: Primary eyecare for young or autistic children

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Abstract

Purpose: Good vision during childhood is vital for visual, educational, and social development. Previous research highlights challenges in the accessibility of eyecare for children. This study investigates the accessibility of primary eyecare for young children with typical development and those with autism in England.

Methods: A telephone survey was conducted using four hypothetical scenarios (a child aged 1, 3, 5 years and a 13-year-old with autism). Four hundred community optometric practices (100 different practices for each scenario) were contacted to explore the availability of an eye examination. The caller acted as a parent, asking about the availability of an eye examination for their child and raising concerns regarding the child. Key barriers and enablers to the accessibility of primary eyecare were identified through an analysis of qualitative information.

Results: Of the 400 practices, only three (<1%) stated that they do not perform eye examinations on children. Fifty-six practices (14%) stated that they would examine a child at any age, the remainder (n=341, 85%) specifying a minimum age at which they would perform eye examinations on children. Lack of '*Communication'* from the child and '*equipment'* were identified as barriers to accessing eyecare for young children. Eyecare for children with autism was enabled by factors related to *adaptability* and *appointment time*.

Conclusion: Our results suggest that communication and a lack of appropriate equipment for examining children are potential barriers to accessing primary eyecare. No clear barriers were identified for an older child with autism. Eye examinations are more accessible for older children in these scenarios (aged 5 with typical development and 13 years with autism) than younger children (aged 1 and 3 years old). The General Ophthalmic Services (GOS) terms do not permit contract holders to exclude categories of patients from a GOS eye exam, our findings suggest this taking place.

Key points

- The results of this study suggest that a child's age could be a potential barrier to accessing eyecare in primary care settings.
- Eye examinations are more accessible for 5-13 year old children than for those between 1 and 3 years of age. This could have implications on a child's development if there is a visual problem.
- Communication and a lack of appropriate equipment for examining children are potential barriers to accessing primary eyecare.

Introduction

The National Health Service (NHS) in England recommends that infants should have their eyes examined for physical anomalies within the first 72 hours of birth and between 6-8 weeks of age, and eye examinations may be arranged if concerns about vision are raised at the age of 1-2.5 years.[1] Vision screening is intended for all children aged 4-5 years, although the

availability of this varies across the country.[1] The Royal College of Ophthalmologists suggests that a routine eye examination is unnecessary in the absence of symptoms in children over 5 years of age however, as the child grows older if there are any concerns with the child's vision or there are symptoms indicative of a visual problem an eye examination is recommended.[2]

Vision screening in children has been found to be beneficial because it allows detection and early (before the age of 8 years) treatment of ocular anomalies[3-4] and visual problems that may be missed in asymptomatic children.[5] Undiagnosed ocular anomalies can result in amblyopia and poor binocular vision,[6] which could, in turn, impact some children's educational progress and behaviour,[7] and potentially increase the risk of an amblyopic child losing sight in their good eye.[8] This may result in long-term impact on career choices.[9] It has been reported that children with a visual impairment and vision worse than 0.30 logMAR in the good eye have a lower quality of life compared to children with no significant visual, physical or learning difficulties.[10] Around 80% of a child's learning happens through their vision, further highlighting the importance of eyecare in children.[11] Uncorrected hyperopia and myopia are linked to underachievement in educational assessments and poor academic performance, respectively.[12-13] Strabismus has a significant impact on a child's self-esteem and self-confidence.[14] Despite this, evidence suggests that local authorities in England have an inconsistent approach to vision screening, resulting in variable coverage for both pre-school and school-aged children.[15-16] This may occur because such screening is not mandatory. While almost all local authorities provide some form of vision screening, less than half of vision screening programmes are compliant with the Public Health England (PHE) specifications.[17-18] This is concerning because children are unlikely to report symptoms, and in view of the links between poor vision and development,[19-20] it is essential that any performed screening or provided eyecare is of an appropriate standard.

Children who fail vision screening are referred to a hospital eye service (HES) or a community optometrist of their choice, depending on the nature of the vision problem suspected. For parents, visiting a community optometrist is likely to be a preferred option due to the convenience and flexibility of appointment times available. However, it is noted that factors such as ethnicity, parental income, parents' level of education and attitude toward diagnosis and treatment may influence attendance at appointments.[21-22] Despite the fact that

community optometrists are well placed to play an important part in children's eyecare, a telephone survey conducted in 2007 reported that 2% of practices would not carry out an eye examination on a child until the age of 7 years and that 54% of practices would exclude young children (aged 1 year) from a General Ophthalmic Services (GOS) eye examination.[23] More recent studies have reported that optometrists often do not examine children aged under 2 years of age,[24] and the median age at which a child's first sight test is conducted in one region of England is 6 years.[25] One study exploring the effect of optometrist practice type on children's first NHS sight test[25] reported that children under the age of 16 attending a multiple practice were more likely to receive a new or changed prescription than those attending an independent practice. In the current study, we explore whether there is an association between practice type and the earliest age at which children are offered an eye examination.

Autism is a lifelong, non-progressive neurodevelopmental disorder. Common traits amongst individuals with autism include impaired communication and social interaction and repetitive and restricted behaviour.[26] Children with autism have normal levels of visual acuity but may have visual problems ranging from reduced near point of convergence to retinal structural anomalies.[27] However, there is an inadequate provision of eyecare in special schools attended by children with more severe forms of autism. In 2016, Pilling and Outhwaite[28] concluded that despite children in special schools being at a higher risk of visual impairment, nearly two-thirds of the children from the special schools investigated were not under the care of the HES. Additionally, children with autism have relatively poor experiences in healthcare[29-31] and have greater difficulty accessing health and social care[32] due to social interaction problems with the cumulative effect of a shorter lifespan.[33-35] Children with autism reportedly have poor experiences in primary eyecare.[36] We are unaware of any previous research on the accessibility of community eyecare for children with autism.

All children under the age of 16 are eligible for an NHS funded eye examination.[37] As the main primary eyecare providers, optometrists are well positioned to offer those eye examinations, which are within their clinical expertise and help to ensure that all children have accessible eyecare within their local community. The College of Optometrists (UK) guidance states that practitioners should refer elsewhere if they feel a particular case is beyond their scope.[38] However, declining eye examinations for certain groups of children without referring or

directing them to another healthcare practitioner could have negative consequences for those children and their eyesight. The current study aimed to investigate the accessibility in England of primary eye examinations for different age categories of children as well as children diagnosed with autism, and to explore correlations between practice type and the earliest age at which the practice will examine children.

Methods

Ethical approval for this study was obtained from the City, University of London's Senate Research Ethics Committee. A telephone survey was conducted between August and September 2019 to gather qualitative and quantitative data on the accessibility of eye examinations for children. The survey consisted of four hypothetical scenarios: a child aged 1, 3 or 5 years and a 13-year-old with autism. For each of the scenarios there was a specific concern regarding the child's eyes. For scenario 1 a concern about an 'eye turn' (in the 1-year-old), scenario 2 'short-sightedness' in the family (3-year-old), for scenario 3 following advice from school to arrange an eye examination (5-year-old), and scenario 4 consisted of no specific concern in the case of a 13-year-old with autism. Data were collected using scenario-specific scripted questions to investigate the youngest age at which a child would be offered an eye examination, whether the practice would offer an eye examination to a child in a particular scenario, the cost of the examination (if applicable) and where the parent could seek further help if services were not offered by the practice (Appendix 1). During each phone call, the researcher (author SA) acted as a mother concerned about her child's eyesight and queried the availability of an eye examination in one of the four scenarios. The scenarios were based on previously reported vision anomalies and specific concerns in children in each of the age groups, or with autism, and challenges in adapting to new environments.[39-42] The telephone survey was conducted by one researcher to maintain consistency in data collection.

Sample selection

Community optometric practices providing eye examinations were identified using a random postcode generator and an online search engine. The postcode obtained was entered into the search engine, and the first three practices were selected. This process of obtaining a

postcode and finding practices in that location was repeated with different postcodes until a sample of practices was obtained.

If a practice appeared in the search more than once and had already been included in the study, then the next optometric practice from the search result list was contacted. If there was no answer on two attempts of trying to contact a practice, then the next optometric practice on the search results list for that postcode was contacted. During the selection process, the sample was monitored to ensure that independent and multiple practices were similarly represented. An independent practice is defined here as an optical business that is either a sole practice, a small practice group or partnership.[43] Multiple is defined here as an optical business that is a franchise, joint venture, or single corporation with multiple branches nationwide.[43]

Sample size

An appropriate sample size calculation was conducted to establish the minimum number of practices (280) required to investigate all four scenarios in the survey (95% power $Z\alpha/2= 1.96$, $Z\beta=1.64$). Four hundred different optometric practices were contacted, with 100 optometric practices being contacted in each of the four scenarios. This was done to help obtain a representative data set of the population of interest, to help reduce the possibility of selection bias using the chosen method and to avoid practices becoming aware that the caller was conducting a research study.

During the telephone call, information was obtained from the practice staff member who answered the telephone. The researcher made notes on how the information was provided by this person (e.g., whether the staff member responded independently or conferred with the practice manager). Any additional relevant information was also documented. No prompts were used during the collection of the additional information. The scenario-specific scripted questions were used in all cases; if a member of staff elaborated and gave more information than was asked for, this was noted, and they were thanked. No appointment was made, but the member of staff was thanked for the information they provided.

Statistical analysis

All analyses were conducted using SPSS version 25.0 (IBM, ibm.com).[44] Non-parametric tests were conducted and p-values less than 0.05 were considered statistically significant. The Wilcoxon Signed-Rank test was used to compare responses obtained for each scenario before and after the concern raised by the parent (e.g., an 'eye turn'). The Mann-Whitney test was used to compare the results obtained from different practice types. Analyses of accessibility were conducted by comparing the level of deprivation of the location of the practice to the earliest age at which they offered eye examination to children. This was undertaken by finding the Index of Multiple Deprivation[45] for the postcode of each included practice and testing the correlation between this and the earliest age at which children would be offered an eye examination at each practice. The researcher (SA) analysed the anonymised notes (additional information) obtained during the telephone survey multiple times before coding the information. Qualitative data were first coded by SA and categorically arranged into themes. To ensure coding validity, the data were checked independently by another researcher (CS), and any disagreements were resolved through discussion.

Results

Three hundred and ninety-seven out of 400 optometric practices contacted stated that they perform eye examinations on children. These 397 practices were asked what age they start testing children in their practice, followed by scripted questions from one of the four pre-allocated scenarios. The results in Table 1 show the combined responses from all 400 optometric practices when asked the second question in the survey, "At what age do you start testing children at your practice?" and the age at which practices would examine a child after explaining the concern in each scenario. Thirty of the two hundred practices contacted for scenarios 1 and 2 changed their response relating to the age at which they examine children after they were made aware of the scenario. These differences are stated as comments in Table 1. This has been further explored for each scenario, and the median age at which a practice would examine a child after an explanation of the concern in each scenario is illustrated in Table 2. Detailed analysis (Table 1) highlighted that 56/400 (14%)

practices would examine a child of any age, and the remaining majority reported that they examine children beginning at 4 -5 years of age. The median age at which the optometric practices stated they start to examine children was 4 years (IQR 3-5 years). As 100 different practices were contacted for each case scenario, the type of practices in each group could result in variability. A statistically significant difference was found in the samples' practice types used in the scenarios. These differences were particularly noticeable for scenarios 1 and 4, scenarios 1 and 3, scenarios 2 and 4 and scenarios 2 and 3 ($H(3)= 30.39$, $p < 0.001$). Statistically significant differences were found for the practice type used for each scenario, with some practices more likely to see young children than the total sample.

Table 1. The earliest age at which practices stated they would examine a child in response to the question, "At what age do you start testing children at your practice?", as well as the ages at which the practices stated they would examine the child once they were informed of the scenario and comments to explain the differences in responses.

Age (years)	Number (%)	Number (%) Response following presentation of scenario	Comments
Any age	56 (14.0)	53(13.25)	3 practices from the scenario 1 sample initially said any age to question 2 however, once informed of the child and age, they declined to examine the child at any age.
1	3 (0.75)	13(3.25)	10 practices of the 100 contacted for scenario 1 that initially gave an older age for question 2 however, changed their response when they were willing to offer services after the presentation of a 1-year-old child.
2	6 (1.5)	6(1.5)	No change in responses.
3	61 (15.25)	81(20.25)	20 of the 100 contacted for scenario 2 initially gave an older age for question 2 however changed their response when they were willing to offer services after presenting a 3-year-old child.
4	125 (31.25)	103(25.75)	22 practices of the 200 practices contacted for scenario 1 and 2 who initially answered question 2 with the age of 4 years and then changed their responses in light of the scenario.

5	136 (34.0)	133(33.25)	3 of the 200 practices contacted for scenario 1 and 2 who initially answered question 2 with the age of 5 years and then changed their responses considering the scenario.
6	10 (2.5)	8(2.0)	2 practices of the 200 practices contacted for scenario 1 and 2 initially answered question 2 with the age of 6 years and then changed their responses considering the scenario.
Do not examine children	3 (0.75)	3 (0.75)	The scenarios were not presented, as they do not examine children.

(Scenario 1= 1 year old with an eye turn, Scenario 2= 3 year old with family history of myopia, Scenario 3= 5 year old advised by school for an eye examination and Scenario 4= 13 year old with autism.)

Table 2. The median age at which practices would examine children in each scenario once the concern relating to the relevant scenario was explained (IQR=inter- quartile range).

Scenario	Median age at which practices would examine a child (years)
1 year old	4 (IQR 1-4)
3-year-old	3 (IQR 3-4)
5-year-old	4 (IQR 4 -5)
13-year-old	5 (IQR 3-5)

Scenario 1

Of the 400 practices, 100 were contacted with scenario 1. As indicated above, practices were asked whether they perform eye examinations on children and the earliest age at which they would examine children. The scenario-specific questions were then asked. In response to the question: "My son is a 1-year-old. Is there any chance of getting his eyes checked by your optometrist?," 22% (n=22) of practices would offer an eye examination to a 1-year-old child. A further 7% (n=7) of practices were willing to examine the 1-year-old when they were informed that the mother was concerned that an eye might be turning in.

Seventy-one optometric practices declined to examine the 1-year-old child in this scenario despite the mother's concerns. The difference between the number of practices declining before (78/100) and after (71/100) the concern was conveyed and was found to be statistically significant (z = -2.646, p=0.008).

Scenario 2

Exactly half (50) of the 100 practices contacted for scenario 2 were willing to examine a child aged 3 years, and half declined. However, these proportions changed when a concern about family history of myopia was raised, with 54% (n=54) of the 100 practices contacted agreeing to examine the child and 46% (n=46) declining. The difference in responses triggered by the concern was statistically significant (z = -2, p= 0.05).

Scenario 3

Ninety-eight percent (n=98) of the 100 practices contacted for scenario 3 offered an eye examination to the 5-year-old, with one of the two declining practices offering an eye examination when the concern regarding the child (referral from school screening) was raised. This was not statistically significant (z = -1, p=0.32).

Scenario 4

Almost all (99%, n=99) of the 100 practices contacted about scenario 4 offered an eye examination for the 13-year-old with autism. When questioned further, the one practice that declined reported that they were dependent on locum optometrists and were not sure if the optometrist in practice on the day would examine the child.

Independent and multiple practices

A total of 198 multiples and 202 independents were contacted. The median earliest age at which a multiple or independent practice offered an eye examination to a child was 4 years in both cases, with a notable difference in the IQR (4 to 5 years and 1 to 5 years, respectively). This difference was statistically significant (U =26198, p<0.001). Figure 1 illustrates the spread of ages at which eye examinations were offered to young children at each practice type. The results in Figure 1 illustrate the answers received in response to question 2 of the telephone survey, indicating the youngest age practices examine children prior to introduction of the scenario specific information.

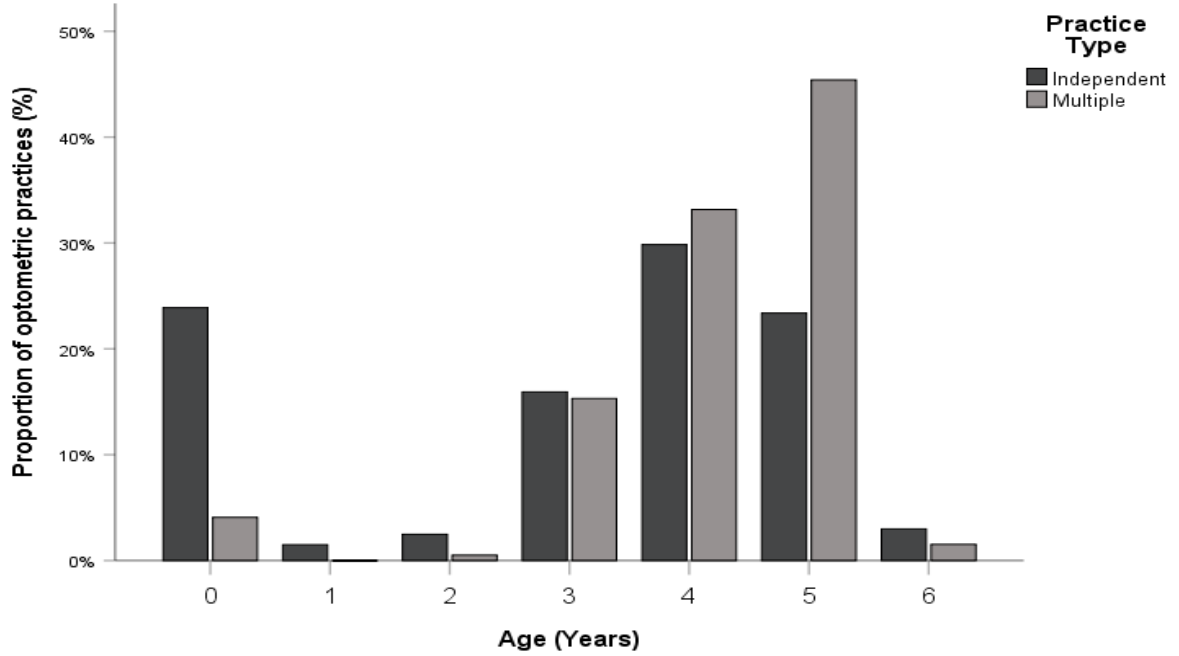

Figure 1. The earliest age (rounded to the nearest year) at which the independent and multiple practices in this sample offered an eye examination to children (0 = any age; there was no age restriction).

A statistically significant difference was noted between multiple and independent practice types, whereby independent practices were more likely to offer an eye examination for a child instead of recommending that the child be seen elsewhere (chi-squared test, $p<0.005$). Of the multiple and independent practices that declined to examine the 1-year-old and 3-year-old, the median age at which those practices would examine children was 4 years (IQR 3-5 years) and 4 years (IQR 4-5 years), respectively.

Eye examination fee

Of the 400 practices, 397 stated that they offered children's eye examinations. Of these, 281 were willing to offer an examination based on the information provided during the telephone call. Two hundred and seventy-nine of these 281 practices would provide an NHS funded eye examination. Two practices offered private eye examinations, as they did not provide General Ophthalmic Services. Of these, one practice offered to conduct the eye examination free of charge as a goodwill gesture and the other practice would charge £50.

Declining to offer an eye examination

A total of 119 practices declined to offer an eye examination for the child in the scenario. However, all the practices that declined to examine the child recommended getting in touch with different healthcare services to ensure the child's eyes were examined. The frequency of recommendations for the different services in each scenario is documented in Table 3.

Table 3. Healthcare services[†] that were recommended in each scenario ('other' in scenario 1 = call 111 (dialling service to call when you have a medical problem and are unsure of what to do) and in scenario 2 = wait for school screening).

Recommended service	Scenario 1 (1-year old)	Scenario 2 (3-year-old)	Scenario 3 (5-year-old)	Scenario 4 (13-year-old)
General Medical Practitioner or Health Visitor	67	34	0	0
Hospital	6	8	0	0
Another Optometrist	4	3	1	1
Other	1	1	0	0

[†] 7 optometric practices gave more than one recommendation as an option to the parent.

Figure 2 illustrates the location of the 400 practices that were contacted, illustrating the extent of geographical coverage.

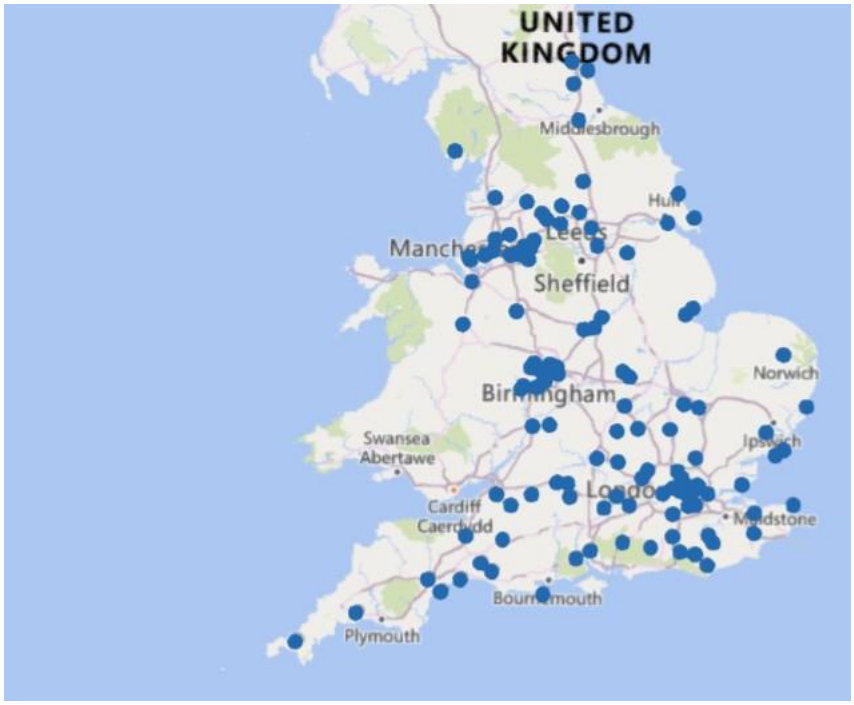

Figure 2. A map showing the geographical locations of the practices contacted during this survey.

The Index of Multiple Deprivation (IMD) is a measure of relative deprivation of small areas in England, ranking them from 1-32,844. An index of 1 suggests that this area is the most deprived, and an index of 32,844 would be the least deprived area.[45] No statistically significant correlation was found between the age at which practices start to examine children and the deprivation level of the practice location ($H(6)= 5.419$, $p= 0.49$).

One hundred and eighty-nine comments from respondents were coded and categorised into eight themes. Not all the information was obtained directly from the respondent. Of the 189 respondents, 30 practices confirmed the information with another staff member (16 optometrists, two dispensing opticians, one supervisor, 11 unknown staff members) before conveying the information.

This information was categorised into enablers and barriers to accessing eyecare. Factors facilitating access to eyecare were categorised as enablers, while those indicating limitations to access were categorised as barriers. Themes and codes alongside the indicative additional notes and frequency of the code are shown in Tables 4 and 5. Additional information relating to scenario 3 was not obtained and is therefore not included in the qualitative data.

Table 4. Enablers in accessing eyecare for young children with examples summarising the information provided. Note that verbatim comments are not provided, as the call was not recorded.

Theme	Code	Frequency	Example summary of a telephone conversation
Eye examination	Access	7	We can book an eye test but advise you also speak to your health visitor or the hospital as they have age-appropriate eye tests.
Professional skills	Professional skill	3	We are happy to see the child due to the concern [e.g., eye turn], and there is a particular optometrist we recommend who would be best examining the child.
Adaptability	Adapting	13	We can adapt to make the child feel more comfortable and book two time slots for the appointment.
	Preparation	9	We will inform the optometrist, so they are aware.
	Familiarisation	1	We advise you and the child to visit the practice, so the child adapts to the environment before booking an eye test.
	Trained	6	We are all trained to see people with autism.
Appointment time	Specific day	7	Sundays are better for children as it is quieter.
	Longer appointment	10	Extra time will be given to the child to make them feel at ease.

Table 5. Barriers to accessing eyecare for children with some examples of information given.

Theme	Code	Frequency	Example summary of a telephone conversation
Communication	Age	25	They are too young to be seen by the optometrist.
	Alphabet	2	The child may not know their letters, so it will be hard to examine them.
	Speech	1	The child needs to be able to communicate.
Equipment	Cycloplegia	9	It is better to see your general medical practitioner as your child will need drops in his eyes and a referral to the hospital.
	Equipment type	6	Go and see your general medical practitioner as we do not have the appropriate equipment.
Monitor child	Monitor child	1	Watch the child to see if he squints.
Type of eye examination	NHS contract	3	We do not see children as we do not have an NHS contract.
Management	Refer to a General medical practitioner or health visitor	63	See your health visitor or doctor due to the concern you have.
	Refer to a hospital or another optometrist	11	Go to the hospital and also visit [practice name] optometrists will see a child of that age.
	Referral needed	2	The child may need a referral if there is a strabismus.

	Professional skill	6	Optometrists do not see children at that age.

Further analysis was undertaken of the codes relating to referral within the management theme, as shown in Table 6.

Table 6. Classification of the management theme for scenario 1 (1-year old child) and scenario 2 (3-year-old child) with examples of information provided.

Scenario	Theme	Reasons	Frequency	Example summary of a telephone conversation
1	Management	Communication	11	See a general medical practitioner as the child is too young to be seen at an optometrist practice. See your general medical practitioner as the child is too young and will not understand the test.
		Equipment	3	See your general medical practitioner who can refer on to a hospital eye service who have tests for children at that age.
		Professional skills	3	You should visit your general medical practitioner if concerned as we cannot do much at the practice .
		Time	3	It would be a quicker pathway to see a specialist at the hospital.

		Responsibility	3	Your general medical practitioner or health visitor should be the first point of contact.
		Strabismus	1	The child may need a referral if there is a strabismus.
2	Management	Professional skills	3	Go to another optometrist that sees children from the age of 2 years."
		Equipment	3	Go to the hospital as they can do a more accurate test.

Discussion

Accessibility to paediatric eyecare is influenced by several factors, including eye health education, conflicting family needs, socio-cultural background, economic ~~conditions~~conditions, and lack of awareness from parents about the importance of eye examinations.[22] Optometrists are the leading primary eyecare providers in England. The present study sought to determine the accessibility of primary eyecare for children. It is reassuring that 99.3% (397/400) of optometric practices in this sample were willing to examine children's eyes, although 85% would not examine children below a certain age (median 4 years). Our findings are in line with earlier studies, which reported that some optometrists are reluctant to examine very young children. [23,25]

The Royal College of Ophthalmologists state that routine eye examinations for asymptomatic children over the age of 5 years are unnecessary.[2] However, according to the primary ophthalmic services regulations, eye examination services are considered "mandatory services" to those individuals who are eligible, including children under the age of 16.[46] The College of Optometrists has provided professional guidance to help support optometrists when examining young children,[47] and introduced the professional certificate and professional higher certificates in paediatric eyecare for optometrists to gain additional training and confidence in this area.[48] Therefore, practices and optometrists should be able to provide eye examinations for patients who may present with challenges; for example, young children or those with learning difficulties. It is noteworthy that 85% of practices in the present study excluded children based on their age.

The results from scenario 1 showed that only 22% of practices would offer an eye examination to a 1-year-old. This is of concern because, at this age, the visual system is still developing. With additional concerns about the presence of strabismus, this increases the importance of having an eye examination.[7] Our results are not surprising, given that Doyle et al.[24] reported that 66% of the optometrists who completed their questionnaire did not examine children under the age of 2 years. In scenario 2, when seeking an eye examination for a 3-year-old whose parents are myopic, only 54% of practices contacted said they would examine the child. A 3-year-old child is likely to be able to correctly name colours, count and identify and match objects.[49] Additionally, objective testing is possible if a subjective response cannot be obtained during the examination. Examining children early when there is a family history of myopia is important as it has been reported that children in the United Kingdom who have one myopic parent are three times more likely to become myopic.[50] If both parents are myopic, the child is seven times more likely to develop myopia.[50] Research has shown that the prevalence of myopia in the United Kingdom is rising;[51] therefore, children who are at higher risk of developing myopia should be seen earlier, with advice regarding environment and lifestyle given to the child's parents to help delay the onset of myopia.[52]

Only one practice declined to see a 5-year-old referred from school screening and advised the mother to visit another practice because they do not examine children and do not hold an NHS contract. In the present study, the accessibility of eyecare for children with autism was explored using a hypothetical scenario of a 13-year-old child whose mother informed the practice of the child's challenges with adapting to new environments and how this impacts his communication. Only one optometric practice declined to offer an eye examination as they reported that they do not examine children and were not sure if the locum optometrists would examine the child. The practice staff advised checking with another practice whether they were able to examine the child. It is reassuring that almost all optometric practices offered an eye examination for a child who may present some behavioural challenges and is relatively likely to have a visual problem such as reduced near point of convergence or strabismus.[27,53]

Our results suggest that independent practices are willing to examine children at a younger age than multiple practices. Some multiples were willing to examine a child irrespective of age, whilst other multiples only examine children at 4 years and above. This is an interesting

finding because in theory, the type of practice should not affect the accessibility of a service. Previous research on practice type and eye examination outcome found that children under the age of 16 were more likely to be referred on to secondary care or prescribed a new or changed prescription by a multiple compared with an independent practice.[25] Independent practices tend to be owned by a single registered optometrist or dispensing optician[43] with the flexibility to tailor their services and resources to their patients. Multiples tend to be franchise, joint venture or single corporations, and their range of services vary as they may be part-owned by another registrant, but the host brand is involved in management and policy.[43] As multiples and independents are managed differently, the flexibility in time and resource allocation may differ, and the feasibility or policy related to conducting eye examinations on young children with appropriate testing may vary between practice type. This may result in restricted services in some practices due to financial or organisational constraints rather than practitioners being unwilling to examine children. It has been found that multiples in some areas employ optometrists that have less clinical experience, which has shown to influence the manner in which referrals are made[54] and therein could limit the accessibility of their services due to the practitioner's inexperience.

Several practices declined to offer an eye examination despite the parent's concerns. The results from scenario 1 show that practices predominantly advised the parent to visit the general medical practitioner or health visitor. Children's eye examinations and assessment of binocular vision anomalies are not key specialities for general medical practitioners and health visitors. The Vision of Britain report stated that 32% of general medical practitioners feel "de-skilled" in diagnosing eye conditions, and 44% of general medical practitioners felt less confident with conditions of the eye compared with other parts of the body.[55] Despite practices believing it is more appropriate to be seen by a general medical practitioner or health visitor who can refer the child onto the HES, it could be argued that optometrists are best placed and best equipped in this situation to examine the child and make an appropriate referral if needed. Skills relating to the assessment and management of children's visual function are taught and assessed as part of the training and registration of UK optometrists. At the time of qualification, optometrists have the skills and aptitude to examine children though confidence is likely to develop with experience. The practices that advised the mother that the child should be taken to the hospital to get their eyes examined could potentially be

causing additional burden and cost implications on secondary care services through an unnecessary referral. Examination of this category of patients can be undertaken in a primary care setting, but it is important that age-appropriate vision tests are available with additional time allocated for the appointment, should this be necessary, to ensure that the test and outcomes are reliable.

Our findings suggest that age influences the accessibility of primary eyecare for young children. One possible explanation for this might be the perceived barriers in community practices, such as children having a short attention span, leading to the possibility of an incomplete assessment; hence, a need for multiple visits.[21] It is reassuring that our findings regarding the child with autism showed that practices were willing to be adaptable by offering additional time and advising the parent that the child should be seen when the practice is quiet. The Directorate of Optometric Continuing Education and Training (DOCET) has focused on paediatric optometry to help registered optometrists in the United Kingdom feel more confident and competent in examining children. Despite these efforts, there still seems to be a gap either in the skills, competency and/or experience in examining young children. A previous survey on the availability of NHS funded eye examinations for children[23] found that 54% of practices effectively excluded young children (aged 1 year), and 2% of practices did not see children under the age of 7 years. The current study results show that 85% (based on question 2) of the practices would exclude a child from a GOS eye examination based on their age, and 2.5% of the practices would not examine a child under the age of 6 years. After the concern in scenario 1 was explained, 83.5% of the practices remained unwilling to examine a child of 1 year.

Research on geographical inequalities in eyecare has found that the most deprived areas have a lower uptake of primary eyecare.[56] However, we found no significant correlation between practice location, level of deprivation and the earliest age at which the practice would examine a child. These findings suggest that the lower uptake cannot be explained by relatively low willingness to examine children among practices in deprived locations.

Analysis of the qualitative comments allowed the identification of factors limiting (barriers) or facilitating (enablers) children's access to community eyecare. Investigation of the qualitative data from scenario 1 (1-year old) and scenario 2 (3-year-old) highlight communication and equipment as the two key potential barriers to children at these ages.

No barriers were found in the scenario featuring a child with autism, and the key enablers in this scenario (scenario 4) were adaptability and appointment times.

A key concern reported by the optometric practices during the telephone survey related to the management theme. This theme concerned how the practice would manage examinations for young children in their practice of a certain age or with a particular concern. The practices stated that management of children aged 1 and 3 years would be more challenging due to communication, equipment, professional skills, time and perceived responsibility. Scenario 1 (1- year old with a possible eye turn) generated more codes under the management theme (n=47) compared to scenario 2 (3-year-old with a family history of myopia), which is consistent with the fact that more practices declined to offer services for the younger child. Interestingly, further analyses of these data highlighted that 2.25% (n=9) of the included practices considered that a child of 1 year or 3 years with visual concerns should be examined by a general medical practitioner or in a hospital setting as such examinations are not performed by an optometrist in a community setting due to the potential need for a cycloplegic examination. Doyle et al. reported that most optometrists (77%) do not have a concern about using cycloplegia.[24] Qualified optometrists know the appropriate usage, administration practice, and contraindications of cycloplegic drops and have the skills to use an ophthalmoscope and retinoscope. [57] When the theme of management was explored further, it was noted that the most common reason given for the need for a referral in scenario 1 was communication between the child and the optometrist. In contrast, for scenario 2, referral within the management theme was related to the professional's skills and equipment.

The qualitative data revealed that in some cases, access to eyecare for the child was dependent on the optometrist's willingness to examine the child. One possible factor in optometrists' lack of willingness to see young children may be confidence in related skills. Other factors might include resources and the availability of age-appropriate equipment. Whilst specific resources were not indicated as barriers, optometrists have access to a retinoscope and ophthalmoscope to allow them to conduct key elements of the eye examination.

In the present study, communication between the child and the optometrist was considered a barrier in providing services. While objective techniques are available for some aspects of

the paediatric eye examination, the child's age, ability to communicate and their knowledge of the alphabet were factors in the accessibility of eyecare for young children, suggesting that at least part of the eye examination would involve subjective testing.

Previous research reports that patients across the autism spectrum (including those with mild autism) have a very poor experience of primary eyecare.[36] In the present study, the accessibility of eyecare for children with autism was facilitated by advising a longer appointment time. The qualitative data illustrate a perceived need to ensure the child is at ease, attending the practice at its quietest periods so the child can remain calm and relaxed. The additional time helps to achieve this. The staff and the practitioner's adaptability were highlighted by comments indicating that practice staff were trained to communicate with individuals with autism.

Recent studies highlight gaps in accessibility of eyecare for children,[23-25,] and concerns have been raised around school screening not meeting the PHE specifications.[17-18] Moreover, it has been evident that children with a learning disability have problems accessing eyecare.[28] One of the main reasons for underdiagnosing visual impairment in those with learning difficulties is that at times visual signs and symptoms may be incorrectly considered as an untreatable part of their disability.[58] Developments to improve eyecare pathways for those with learning difficulties are underway in parts of England.[59] Research has shown that children in special education benefit visually, and their behaviour within the classroom improves, when a refractive error or visual anomalies are corrected.[60] It is paramount for any child presenting with an eye concern to be offered an eye examination. Following initial primary care investigation, if further assessment is required in a secondary care setting, a referral should be instigated. This would help reduce the burden on secondary care services by reducing the number of children being referred to the HES who can be managed by an optometrist in a primary care setting (e.g., those with refractive amblyopia).[61] Additionally, optometrists have a duty of care towards the wider public. If a particular patient is beyond their scope of practice, the optometrist is best placed to refer the patient to an appropriate professional.

A significant strength of this study is the relevance of the scenarios used during the telephone survey. However, these scenario and practice type findings cannot be extrapolated to all optometric practices across England because a sample of only 400 practices across the country were surveyed. It should be noted that these telephone survey data represent the

responses of staff who regularly answer the telephone. Therefore, they may not represent the optometrist's view on the age at which they would examine young children. However, it is noteworthy that some practices did confirm with their optometrist before advising the caller. The chosen method of sampling may be another limitation. Despite the postcodes being randomly selected, it is recognised that businesses pay additional fees to appear within the top three search results, and this may have introduced selection bias. In addition, the fact that only one scenario was related to autism provides a narrow presentation of the accessibility for children with this type of disorder. Finally, a limitation exists in the manner in which the qualitative data were collected. No prompt questions were used; hence, a talkative staff member may have biased the results by giving more information than requested. Moreover, qualitative analysis was not conducted for scenario 3 due to a lack of sufficient data because the majority of the practices contacted were willing to accommodate the 5-year-old. Therefore, additional information was not gained during the telephone conversations.

Conclusion

In summary, the results show that eye examinations are more accessible for older children (aged 5 and 13 years old) than for younger children (aged 1 and 3 years old). Approximately 30% of practices that declined to examine the child advised that the child should see their general medical practitioner or health visitor. Key themes that play a role in the accessibility of eyecare for children in England include communication, equipment, professional skills, adaptability, and appointment times. These findings indicate a need for further research to investigate community optometrists' perspectives on barriers and the corresponding enablers to examining young children. This will help understand the reasons for the varied accessibility of primary eyecare for children and enable eyecare services in England to improve.

Declaration of interest

The authors report no conflicts of interest and have no proprietary interest in any of the materials mentioned in this article.

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Appendix 1: Questions