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Abstract:	Introduction: Young people with special education needs and disabilities (SEND) are at heightened risk of road traffic injury and their caregivers are often concerned about independent mobility and the safety risks it poses. This qualitative research aimed to increase understanding of the facilitators and barriers to independent mobility for 7-10 and 11-13 year-olds with SEND. Methodology: Thirteen young people (11 male and two female, six children 7-10 years-old and seven children 11-13 years-old) diagnosed with autism, attention deficit hyperactivity disorder (ADHD), or learning disabilities video recorded three journeys they regularly undertook and then participated in a semi-structured interview with their caregiver. A thematic analysis of travel films and interview transcripts was conducted. Results: Younger children were typically not travelling independently, but both older and younger children were anxious about independent mobility. Younger and older children with SEND demonstrated unsafe behaviours in the road, had limited awareness at times of road safety, may become overwhelmed, and required longer to process information. Conclusions: The findings informed recommendations for how to effectively support the independent mobility of young people with SEND. Children are often diagnosed with multiple conditions, and it is the profile rather than the specific diagnosis that impacts their road safety. Targeting specific behaviours rather than specific disorders may therefore be a more effective approach. Road safety was a central concern for caregivers, but it was one aspect of independent mobility and a broad focus on teaching independent mobility was preferable. Support with independent mobility and road safety should be provided by a range of people who come into contact with the young person and education may need repeating at key transition points.
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Journal of Transport and Health

Dear Dr Charles Musselwhite,

Thank you for considering our manuscript 'Promoting the Independent Mobility of Young People with SEND: The Lived Experience of Young People with Autism, ADHD, and Learning Difficulties' for publication in the Journal of Transport and Health.

This qualitative research focuses on a neglected topic: independent mobility in young people with special educational needs and disabilities (SEND). The project used a novel video methodology in which young people between 7 and 13 years-old filmed familiar journeys they made. The young people and their caregivers were also interviewed about road safety and independent mobility. The paper brings these two sources of data together in order to identify effective methods to support the independent mobility of young people with SEND.

This paper expands on a very limited area of research and provides a 'voice' to young people with SEND. The findings of this research are relevant to those within the field of transport, health, and education. We therefore feel that this paper would be appropriate for publication in the Journal of Transport and Health and that it would appeal to a broad audience.

Kind Regards,
Sarah O'Toole

Dr Sarah E. O'Toole, *BSc, MSc, PhD*

1

1   **Abstract**

2   **Introduction:** Young people with special education needs and disabilities (SEND) are at

3   heightened risk of road traffic injury and their caregivers are often concerned about

4   independent mobility and the safety risks it poses. This qualitative research aimed to increase

5   understanding of the facilitators and barriers to independent mobility for 7-10 and 11-13 year-

6   olds with SEND.

7   **Methodology:** Thirteen young people (11 male and two female, six children 7-10 years-old

8   and seven children 11-13 years-old) diagnosed with autism, attention deficit hyperactivity

9   disorder (ADHD), or learning disabilities video recorded three journeys they regularly

10   undertook and then participated in a semi-structured interview with their caregiver. A thematic

11   analysis of travel films and interview transcripts was conducted.

12   **Results:** Younger children were typically not travelling independently, but both older and

13   younger children were anxious about independent mobility. Younger and older children with

14   SEND demonstrated unsafe behaviours in the road, had limited awareness at times of road

15   safety, may become overwhelmed, and required longer to process information.

16   **Conclusions:** The findings informed recommendations for how to effectively support the

17   independent mobility of young people with SEND. Children are often diagnosed with multiple

18   conditions, and it is the profile rather than the specific diagnosis that impacts their road safety.

19   Targeting specific behaviours rather than specific disorders may therefore be a more effective

20   approach. Road safety was a central concern for caregivers, but it was one aspect of

21   independent mobility and a broad focus on teaching independent mobility was preferable.

22   Support with independent mobility and road safety should be provided by a range of people

23   who come into contact with the young person and education may need repeating at key

24   transition points.

25 *Key words: road safety, independent mobility, travel training.*

26 **1. Introduction**

27 A crucial part of achieving independence for all children and young people is having a good

28 grasp of road safety skills. Independent mobility is associated with a host of positive outcomes,

29 including social inclusion, access to employment, education and other services, improved

30 wellbeing and quality of live and increased autonomy (Berg & Ihlström, 2019; Kaufmann et

31 al., 2004; Thynell, 2017; Vella-Brodrick & Stanley, 2013). Added to this, being able to travel

32 around the local environment provides children with opportunities to develop their cognitive,

33 physical and social and emotional skills (Cox, 2020). However, the number of children

34 travelling independently has been declining; with caregivers often stating traffic, distance to

35 destination and personal safety as barriers (Cox, 2020). There may be some children who

36 experience more restrictions in relation to independent mobility than others, such as children

37 with special educational needs and disabilities (SEND).

38 Although understanding of the cognitive and behavioural challenges faced by children with

39 SEND in the traffic environment has increased (Williams, Savill, and Wheeler 2002), there

40 remains a need for research to address the needs of the 3.7% of the school population with an

41 Education, Health and Care Plan (EHCP) (DfE, 2021) who are at most risk, because the road

42 safety education (RSE) is not sufficiently tailored to address their need and requirements

43 (O'Toole & Christie, 2019). While independent mobility has increased prominence in the

44 SEND Code of Practice (DfE, 2020), the potential that some children with learning

45 disabilities, autism and attention deficit hyperactivity disorder (ADHD) have of achieving

46 this – and with it social inclusion – is compromised by a lack of awareness of danger,

47 locating potential hazards, and their proneness to impulsiveness or difficulty in thinking and

48 acting in the flexible ways required to navigate and keep safe in the traffic environment

49 (Graham et al., 2005; Williams et al., 2002).

50 Behavioural road safety training has been found to be effective in improving concept

51 knowledge as well as behaviour and should be carried out from 4-5 years-old through to

52 adolescence (Dragutinovic & Twisk, 2006). This research though often does not evaluate the

53 effectiveness of training with SEND populations (O'Toole & Christie). Research suggests

54 that resources for typically developing children are often modified for use with children with

55 SEND (Williams et al., 2002). Parents have stated that road safety education often fails to

56 provide the extra assistance their children with SEND need and have suggested simpler

57 resources would be beneficial (Graham et al., 2005). However, adapting educational

58 resources for children with SEND is challenging (Klang et al., 2019; Webster & Blatchford,

59 2015). This reflects the debate regarding whether education more generally needs to be

60 adapted for children with SEND. Many teachers do not feel that they have the skills,

61 experience or resources to effectively educate children with SEND (OFSTED, 2004). The

62 view that tailored pedagogical approaches are needed for SEND has been widely critiqued

63 (Thomas & Loxley, 2001) and there has been a greater focus on identifying inclusive,

64 universal teaching approaches (UNESCO, 1994).

65 Research is needed to identify strategies that address the specific challenges children with

66 SEND face in learning road safety skills (Christie, 1995; Williams et al., 2002), and on effective

67 ways to teach them about road safety. This study aimed to increase understanding of the

68 facilitators and barriers to ~~RSE~~ road safety education experienced by children between 7 and

69 13 years of age with SEND. Experiences of younger (8-10y) and older (11-13y) participants

70 were compared. There is a peak in road injuries around the secondary school transition

71 (O'Toole & Christie, 2018). Further, younger children may not be engaging in the same level

72 of independent mobility due to age. Although there is no legal age for children to walk to and

73 from school unaccompanied in the UK, a survey reported that most people felt this should not

74 be until 10 years-old (YouGov, 2012). The Walk to School Campaign, however, support the

75 view that parents should be responsible for deciding when their child is confident and capable

76 to walk unaccompanied to and from school (https://www.livingstreets.org.uk/walk-to-school).

77 There has been a greater reduction in the number of primary school aged children compared to

78 secondary school aged children walking unaccompanied to and from school since 1970 (Shaw

79 et al., 2012).

80 ~~RSE~~ Road safety education for children across categories of SEND including learning

81 disabilities (mild or moderate) and developmental disorders (ADHD or autism). This project

82 aimed to provide a 'voice' to children with SEND and their caregivers by using an inclusive

83 interview procedure. Children were given portable cameras to film three journeys and were

84 then interviewed about these videos along with their caregivers. The video and interview data

85 were used to identify facilitators and barriers to independent mobility and inform effective

86 travel training methods.

87

88 **2. Methodology**

89   **2.1. Participants**

90 The sample included 13 participants (11 male and two female) between the ages of 7 and 13

91 years and their caregivers (Table 1). This included six participants between 7-10 years-old and

92 seven children between 11 and 13 years-old. Participants were recruited via SEND charities

93 and social media channels. Four participants were diagnosed with autism, two of whom had an

94 additional diagnosis of ~~passive~~ pathological demand avoidance (PDA); three participants had

95 ADHD; and six participants had a varied profile of disabilities. Six participants had EHCP.

96

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98

99

100 **Table 1. Sample Characteristics**

	ID	Gender	Age (years)	Ethnicity	Diagnoses	School
8-10y						
	A001	Male	9	White British	Autism, PDA	SEND
	A006	Male	7	White British	Autism, learning disability, sensory processing disorder, hypermobility	Mainstream
	AD001	Male	8	White British	ADHD	Mainstream
	AD002	Male	10	White British	Autism, ADHD, sensory processing disorder, hypermobility and epilepsy	Mainstream
	AD003	Male	9	White British	ADHD	Mainstream
	AD004	Female	8	White European	ADHD	Mainstream
11-13y						
	A002	Female	13	White British	Autism, mild LD	SEND
	A003	Male	13	Black British	Autism and Non-verbal	SEND
	A004	Male	11	White British	Autism and PDA	Mainstream
	A005	Male	11	White British	Autism, Polymicrogyria and epilepsy	Mainstream
	A007	Male	11	White Asian	Autism	Mainstream
	A010	Male	11	White British	Autism, ADHD, dyslexia	Unit in mainstream
	A011	Male	13	White British	Autism, learning disability, hemiplegia and epilepsy	SEND

101

102

2.2. Procedure

Participants were provided with a wearable camera and asked to record three familiar journeys. Participants and caregivers were then interviewed about the films and road safety and independent mobility more broadly. This project received ethical approval. Informed consent was obtained from caregivers and verbal consent was obtained from participants.

2.3. Journey films

Participants were asked to make and film a familiar journey, as they would usually travel (e.g., independently or accompanied by a caregiver; by route and mode of transport) without modifying their typical language or behaviour. They were asked to focus on walking journeys and to include a school/college journey where possible. The journey was filmed to capture audio and visual data. The camera was either worn by the child (attached to a lanyard around the neck) or operated by the caregiver.

2.4. Semi-structured interviews

Following the filming, children took part in a semi-structured interview about their journeys. Caregivers participated in a separate semi-structured interview about the journey and their child's independent mobility and road safety. Interviews were held within two weeks of filming to facilitate participant recall.

The lead author reviewed the films and captured screenshots of significant scenes from the films, such as those involving examples of safe and unsafe road behaviour, or an incident (e.g. child failing to recognise presence of vehicle in car park, Figure 1). Each child was asked questions about selected screenshots presented on a computer tablet, and questions on independent travel and road safety (e.g. how do they travel, where to, and who teaches them road safety). There were visual responses to questions on the tablet that children could select, with support from the researcher. Where interviews were conducted via phone/video calling,

127 these documents were presented on screen or sent to the child (via their caregiver) prior to the

128 interview. Interviews with children lasted approximately 10-15 minutes.

129 Interviews with caregivers either face-to- face or via phone/video calling using a topic guide

130 that explored caregiver views on their child's independent mobility and road safety, plus their

131 involvement in their child's road safety and support from external parties. Interviews lasted

132 between 30-60 minutes. All interviews were audio recorded and transcribed verbatim.

133 [Figure 1 near here]

134 **2.5. Thematic analysis**

135 Following Braun and Clarke's thematic analysis approach (Braun & Clarke, 2006), thematic

136 analyses of film and interview data were carried. This process involved first coding segments

137 of data and then collating these codes in to overarching themes. Journey films were analysed

138 first. Video segments containing both visual and auditory information were coded. These codes

139 were then revised, and themes were created from code groupings. This coding framework was

140 then applied to interview transcripts.

141

142 **3. Findings**

143 Because of the variation in participants' SEND profiles, themes were explored across

144 participants, rather than across diagnoses. Further, it became apparent after analysis had

145 commenced that themes were reflective of the sample as a whole rather than diagnostic

146 categories.

147 Thematic analysis resulted in three main themes being identified: 1) Independent mobility; 2)

148 Child factors; and 3) Supporting children's independent mobility.

149   **3.1. Independent Mobility**

150   *Perspectives on independent mobility.* Caregivers of younger and older children wanted their

151   child to be independent, including travelling independently, as they moved into adolescence.

152   However, independent mobility and particularly road safety were major sources of anxiety and

153   stress for caregivers. Caregivers felt they as well as their child needed to build confidence.

154   Younger children were typically not travelling independently, but most were undertaking some

155   preparation towards independent mobility, though this varied greatly. Some younger and older

156   children wanted to start making trips independently, whereas others (mainly diagnosed with

157   autism) preferred to travel accompanied:

158   *'……I am aware that some of his friends are doing things like going to the*

159   *park on their own and that's not something I can see myself letting him do*

160   *for several years because of the roads on the way there, but it's just*

161   *starting to become relevant for him.' (Caregiver A004)*

162   Some caregivers felt that their child unlike their peers would not be progressing to traveling

163   independently to school or with friends. Some caregivers felt their children were unlikely to

164   travel independently in the future whereas others felt they may eventually be able to travel

165   familiar routes independently.

166   *Road Safety.* Both safe and unsafe crossings were seen both at the road and at designated

167   crossings (e.g. PELICAN, Zebra) in the video diaries. When crossing minor roads or vehicle

168   accessways children more often failed to follow the highway code. There were incidents of

169   participants stepping into the road to cross when there were oncoming vehicles. A few children

170   reported having serious incidents in the road environment:

171   *'... basically I ran across the road because I was excited to go to the*

172   *park but [a car] was going fast; it slowed down but it didn't stop. It*

173   *tried to curve around me and that's why I ended up hitting it ... I mean I*

174   *was okay...I was crying but I wasn't crying so bad because it wasn't*

175   *that much of a hit.' (Child AD003)*

176 Caregivers of younger participants demonstrated inconsistent hand holding in the video diaries.

177 There was a tendency for caregivers to hold their child's hand more often when crossing the

178 road or in busier environments. Caregivers and children also interchanged who was walking

179 roadside.

180   **3.2. Child Factors**

181 *Awareness.* Both older and younger children were thought to understand road safety rules but

182 fail to implement them because they are distracted, consumed by their own interests, or

183 overwhelmed:

184   *'She would know that the road is danger but she wouldn't necessarily be*

185   *thinking about it...' (Caregiver A002)*

186 This was evident in video diaries as children were seen distracted by phones, magazines or the

187 environment. Caregivers were particularly concerned that children were often unaware of

188 danger, especially in car parks and had limited understanding of personal safety and personal

189 boundaries. Indeed, in their videos, children often walked near other pedestrians and cycled or

190 scooted on the pavement, weaving in-between pedestrians:

191   *'[He] is very comfortable speaking to adults, loves hugging people and*

192   *doesn't always think...' (Caregiver A001)*

Anxiety. Younger and older children were anxious about traveling independently as well as about unexpected events, dogs, groups of young people or disorderly behaviour and this at times overwhelmed them and they were unable to focus on road safety:

> *'I think anxiety plays a part…very quickly if the situation isn't as he*
> *expects, he will get to panic very quickly, whereas I observe that some of*
> *his typical friends would think their way through it. I think his brain gets*
> *overloaded and his nervous system kicks off faster...' (Caregiver A004)*

Cognitive abilities. Caregivers reported children required longer to process information and had poor short-term memory. Sensory processing was challenging for children, particularly with autism, and the majority found environmental noise overwhelming. Children with autism were often described as very rules focused and followed the rules rigidly:

> *'If there was one thing I don't really like it is most probably like all the*
> *people in cars .. because they are like quite loud and it disturbs me.' (Child*
> *A010)*

Impulsivity. Children's impulsivity reduced caregivers trust in their children's ability to manage crossings independently. Caregivers, typically of younger children, discussed that they could not always trust their children in the road environment because they would run off or run across the road. Some children repeatedly asked caregivers if they could cross even when there were oncoming vehicles or repeatedly pressed the button at PELICAN crossings:

> *'…he knows what to do but I wouldn't trust him to do it on his own yet.*
> *Because he just wouldn't have the patience – if he saw a gap I think he*
> *would just go…' (Caregiver AD001)*

217 **3.3. Supporting Children's Independent Mobility**

218 Caregivers thought that road safety should be taught when children were motivated, in a
219 practical manner when they were out with children, and in small stages as it was easier for
220 children to focus and learn the lessons. Caregivers felt that teaching road safety would be a
221 gradual and sequential process and would involve reinforcing and repeating lessons to ensure
222 that children could remember road safety rules:

223 *'… if they're sitting in a class and they're like talking and obviously it's not*
224 *going in, I think it should be like more of a practical session like they do*
225 *with like bike riding and that sort of thing.' (Caregiver AD003)*

226 Caregivers coached children how to identify safe places to cross and how to safely cross
227 different road types and use road crossings. At crossings, caregivers often reminded
228 participants to wait, look, and ensure that vehicles had stopped prior to crossing. Caregivers
229 engaged with children; asking what they needed to do when crossing the road / using a crossing,
230 enabling children to demonstrate their knowledge and abilities. Caregivers felt independent
231 mobility required a lot of preparation, especially preparing their children for unforeseen
232 circumstances as they felt this would cause their anxiety and reduce their ability to safely
233 manage the situation.

234 Caregivers did not consistently teach children how to safely cross the road at each crossing,
235 despite highlighting the need for consistency in their interviews. There were occasions where
236 parents led the crossing and did not coach the participant. This may be because caregivers often
237 mentioned that children needed to be motivated to engage in road safety. Caregivers may be
238 tailoring their support based on child need:

239   *'I do try and get him to do it but it depends where he's at emotionally. He'll*

240   *often be like, "Uh, I'm not doing it," particularly on the way to school or*

241   *the way from school.' (Caregiver A004)*

242   ***Variability.*** Caregivers felt that children diagnosed with the same condition may vary

243   considerably and therefore it is not always appropriate to teach everyone in the same manner.

244   Caregivers felt that children's level of hyperactivity and concentration could vary across the

245   day or day to day and would alter the level of freedom they offered children in the road

246   environment based on how they were at the time:

247   *'... at the end of the day he'd be exhausted and it's then sometimes*

248   *irrational behaviour could come out.' (Caregiver A010)*

249

250   There was a slight tendency for caregivers of children attending SEND schools to report road

251   safety was not being taught or be unsure whether it was covered. A couple of caregivers of

252   children at SEND schools did report the school supporting children with accessing the

253   community and felt it may covered as part of this. Participants attending SEND schools were

254   more often in secondary school and this may account for the lower engagement with road safety

255   as it is more often a focus in primary schools.

256   ***Resources.*** Caregivers were not using any road safety resources. Caregivers felt that school

257   support with travel training was valuable as children were more likely to listen to their teachers:

258   *'... that it's being taught not just by a parent but by a teacher...children*

259   *have selective hearing to parents.' (Caregiver A010)*

260 Some caregivers and children reported the school did not teach road safety and some said the

261 school had taught road safety as part of social development or in more formal lessons. Some

262 caregivers were unsure whether the school had taught road safety or not.

263 *Others.* Family relatives also taught children road safety when they were out with them,

264 including grandparents and siblings providing other role models. Siblings were seen running

265 ahead, running across the road, texting while crossing the road, or walking on the edge of the

266 pavement. Children ran across the road when there was a crossing patrol officer. Caregivers

267 and grandparents were seen cycling on the pavement.

268

269 **4. Discussion**

270 Providing early support with independent mobility for children with SEND has a significant

271 social and economic impact; providing opportunities to socialise, engage with the community,

272 and travel to places of study or employment. In line with the finding that fewer primary school

273 aged children are walking to school (Cox, 2020), younger children were not travelling

274 independently in the present study. However, younger and older children were anxious

275 regarding travelling in their local community. There were few age-related differences. Overall,

276 younger and older children with SEND demonstrated unsafe behaviours in the road, had limited

277 awareness at times of road safety, may become overwhelmed, and required longer to process

278 information. The presence of SEND may result in a more protracted course of the development

279 of the cognitive and social skills required for independent mobility. This is a pattern that may

280 be more characteristic of children with SEND. Typically developing children evidence gains

281 in their cognitive and behavioural control as they approach adolescence (Prencipe et al., 2011),

282 but children with SEND often continue to find cognitive and behavioural control a challenge,

283 which can impact their road safety (Tabibi, Schwebel & Zolfaghari, 2021).

284 Building on prior work that suggested ~~that~~ inclusive universal education approaches are
285 effective (UNESCO, 1994), this research suggests that independent travel training should ~~be~~
286 ~~behaviour based and not needs based~~focus on behaviours that children are presenting that may
287 impact road safety and independent mobility (e.g. anxiety or awareness of danger) across
288 SEND diagnoses, rather than focusing on specific SEND groups . Although there were some
289 disorder specific behaviours (e.g. running ahead was more common in an ADHD profile and
290 wanting to be accompanied in the roads was more common in an autism profile), these
291 behaviours were not universal and children often had multiple diagnoses with overlapping
292 profiles and impacts on road safety. Further, the presentation of these behaviours may vary
293 with age (Steinberg, 2008). For example, impulsivity in younger children may present as
294 running across the road and in older children as repeatedly pressing the button at the crossing.
295 However, their impacts on safety are the same e.g. crossing before it is safe to do so.

296 The findings highlighted some recommendations for effective travel training methods.
297 Caregivers wanted to support their children to be independent but felt they needed to build their
298 confidence and trust in their child's ability. Caregivers, generally, are worried about the
299 dangers of their children travelling in the local environment (Cox, 2020). This may be a more
300 prominent concern for caregivers of children with SEND due to the impacts of their conditions
301 on their road safety. Parents of children with SEND, unlike parents of typically developing
302 children, report that they are anxious of the impact of SEND on children's road and personal
303 safety (O'Toole & Christie, 2019). Further, children themselves, particularly those with autism,
304 were often highly anxious about independent mobility and resistant to travelling independently.
305 Children needed to be emotionally ready and motivated for travel training and training needed
306 to ~~be tailored~~be tailored to an individual timeline. Children may be more engaged when they
307 are autonomously motivated (Reeve, 2002). That is, children will be more engaged and perform
308 better in independent travel training if their internal goals surround being independent. This

raises questions around whether parents and children themselves perceive independent mobility as possible or safe in the context of their diagnoses; this is an important question for future research.

Teaching road safety while out walking and in short bursts was felt to be the most effective method in the context of children's limited attention, challenges with abstract constructs, and limited information processing and memory capacity. Caregivers felt children often knew how to cross the road but failed to implement this knowledge if they were distracted, impulsive, or overwhelmed. Indeed, children with ADHD take longer to decide when to cross and demonstrate more unsafe crossings than typically developing children (Tabibi et al., 2021), indicating that failure to implement road safety knowledge is heightened in children with SEND. Unforeseen circumstances (e.g. late bus) were sources of anxiety for caregivers and children. Providing children with opportunities to practice road crossing and manage unforeseen circumstances under the supervision of an adult may assist children in being able to consolidate and adapt to different scenarios - an approach found to be effective with typically developing children (O'Toole & Christie, 2019).

Caregivers, particularly those of children attending SEND schools, often reported a lack of awareness of ~~what~~ whether road safety was- covered at school. Fantuzzo et al. (2004) found that building links between school and home in teaching independent mobility may be effective as caregivers believed children were more likely to listen to their teachers. Providing caregivers with informal updates (e.g. via school diaries/parents evening) in relation to road safety skills taught at school, especially if this is linked to aims and targets concerning to independence in the child's EHCP, may facilitate these links. There were examples of the school reinforcing road safety lessons when the caregiver reported an incident on the route to school. To further support home-school links, 'homework' tasks could be set for families to complete in relation to independent mobility (Ávila Daza & Garavito, 2009). These should be reflective of family's

334   needs (Howland, 2006) and could be easily undertaken during the walk to school (e.g. child

335   identifies which directions to look for cars when crossing).

336   Bridging home-school links would further ensure children are receiving correct and consistent

337   messages. Caregivers did not always coach children at every crossing and at times incorrectly

338   used crossings or demonstrated unsafe crossing behaviour. However, it is important to

339   differentiate between unsafe behaviour and higher-level road safety ability. An individual may

340   cross at a PELICAN without relying on the lights but cross safely. This may evidence higher

341   skill. Though, incorrect crossing use was often instigated by caregivers and not child led,

342   suggesting that it was not always evidence of children's skill progression. Thus, it is vital to

343   assess the skill level of the child to determine whether ideal crossing always needs to be

344   modelled and adhered to. A further reason for inconsistent behaviour in the road environment

345   may be due to child motivation to learn. Road safety education may provide a practical context

346   for children to develop cognitive, emotional and social skills. Thus, children's impulsivity and

347   enthusiasm may be chandelled in safe and productive way. For instance, when children are

348   learning self-regulation strategies (at school or home), road safety coaching may provide a real-

349   world practice context.

350   Other individuals, such as siblings, wider family, and crossing patrol officers, may represent

351   important role models/educators of road safety. Engaging with wider family and crossing patrol

352   officers to promote road safety may enable more consistent road safety ~~messaging~~ messages

353   to be passed onto children. Prior research has found that parents often look to the school to

354   provide road safety education and ~~Tt~~here are often challenges in recruiting enough caregivers

355   to support school-based road safety training (O'Toole and Christie, 2019)~~.~~ ~~Ee~~nlisting wider

356   family and crossing patrol officers would therefore address this issue. Future research exploring

357   parent views around who is responsible for teaching road safety (e.g. parents or schools) and

identifying motivations and barriers to parent road safety education would assist in unpacking this finding.

Limitations.. The sample was diverse in relation to difficulties and disorders which prevented needs-specific analysis, so the study may have overlooked the extent to which behaviours such as impulsivity or attentiveness are a greater factor in the ~~RSE~~ road safety education of children with a specific need (e.g. ADHD) versus others. Further, visual and auditory impairments were not considered in this project and the authors acknowledge that specific adjustments to independent travel training may be required in relation to these impairments (Sauerburger & Bourquin, 2020). The sample reflects the gendered nature of SEND, which may mean gender differences have been missed. We note, however, that in the general population males are more likely to be killed or seriously injured on the roads (O'Toole & Christie, 2018). In addition, the study did not include a control group on typically developing children. Future work should compare the road safety behaviour of children with and without SEND in order to explore the similarities and differences in more depth.

Conclusions and Policy Implications. Targeting specific behaviours ~~rather than specific types of SEND~~ may be a more effective approach of teaching road safety than teaching to a particular need. That said, there is value in further research involving a larger sample of children and young people to understand how behaviours and traits such as impulsivity, distractibility and assessing risk, interact with road safety, and use this evidence to inform a broader based road safety curriculum that is more attentive to the needs of those with SEND. With the specific reference to independent mobility in the updated SEND Code of Practice, greater support may be provided by schools (DfE, 2020). Promoting home-school links in relation to independent mobility may reinforce lessons and ensure consistency. In line with the key point in the SEND Code of Practice (~~Education~~DfE, 2020) that 'the transition to adulthood is not a one-off activity', independent mobility education may need to be repeated throughout the child's life,

especially at key transition points (e.g. transition to college) as they may face new challenges. In this sense, ~~RSE~~ road safety education for children and young people with SEND is a process, not an event. It requires schools/caregivers to provide on-going training, coaching and opportunities to practice road-crossing, in addition to whole school or whole year group sessions. A number of actions would support children safe independent mobility such a:

- Developing an assessment of child competence for caregivers and professionals to track children's road safety level.
- Identifying others who can reinforce road safety lessons (e.g. siblings, crossing patrol officers, teaching assistants).
- Providing a guide on skill areas to develop and how these may be impacted by specific behaviours.

- These recommendations are not necessarily specific for SEND populations. For example, repeating road safety lessons across the lifespan, ensuring role models provide consistent examples of safe behaviour and practical and gradual exposure to the roads have also been found to be effective methods of teaching road safety to typically developing young people (O'Toole & Christie, 2019). However, the benefits may be greater for young people with SEND as they often demonstrate greater challenges processing when it is safe to cross and more risky behaviour than their typically developing peers, especially in complex traffic situations (Tabibi et al., 2021).

408 **Acknowledgements**

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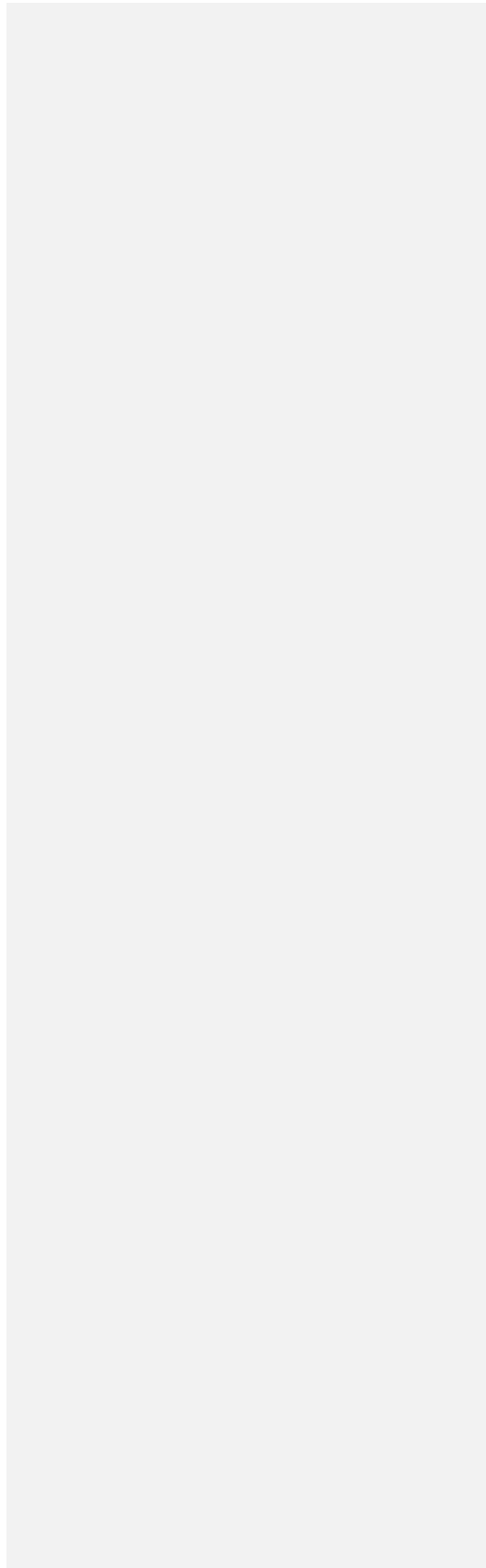
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Figure 1. *Screenshots of child participant in carpark*

2:35 Enter carpark

2:40 Turn left – looking down

2:41 Car approaching – child not looking

2:43 Car passes – child looks at car

2:44 Moves to left hand side – child not looking

- - - - - Target child
····· Caregiver
▬▬ Pavement
▭ Carpark

We would like to thank the reviewers for taking the time to read our manuscript and for their helpful comments and interesting questions raised. We feel that we have addressed the reviewer comments and that this has improved the discussion of the paper.

We address the reviewer comments in the table below.

Although this suggestion is feasible, it cannot be concluded from this study as it only includes children diagnosed with SEND and not a control group without this diagnosis. For instance, caretakers do worry and video registrations show that SEND children sometimes act dangerously on the streets. However, it cannot be excluded that this is because of their diagnoses. This behaviour may also be common among children of the same age without these diagnoses. Indeed, caretakers refer to behaviours that are more problematic compared to those of friends. However, the question is whether this comparison is sufficiently objective. All behaviours and all worries one might also see in the 'control' group.	We thank the reviewer for this useful comment. We agree that the conclusions would be strengthened by the inclusion of a control group, but unfortunately it was not possible in this project. We have highlighted this as a limitation of the research (p17, line 368). We have also strengthened the argument with the inclusion of some further references as to why these findings may be more relevant to SEND populations (p.13, line 279; p.14, line 301; p. 15, line 316). We thank the reviewer as we feel this has improved the discussion.
Further, the recommendations do not differ for both groups, such as the need to practice, that ' knowing is not always doing', that caretakers and important others should model the desired behaviour, and that children should not be exposed to situations they cannot yet handle. A safe environment to practice is a prerequisite for any child's mobility, as is the role of caretakers.	We agree that many of these recommendations may apply to children more generally and this has been highlighted in the conclusions (p. 18, line 394) However, we also discuss how failure to implement knowledge may be a particular challenge in SEND (p.15, line 316).
In this context, this paper raises a lot of questions - and not only for SEND children, related to the interpretation of the findings, such a * How much do parents actually practice themselves with their children or do they perceive that to be the school's responsibility	Thank you for raising this question. This has been incorporated into the discussion on p.16, line 353 onwards.
* Is safe independent mobility possible given the local traffic situation or the child's diagnoses? * Do parents believe that independent mobility can ever be safe enough for their child?	These are some interesting and related questions raised. This has been incorporated into the discussion on p.14, line 308.
1. Explain in more details Brown's themed analysis method	I am not sure the method the reviewer is referring to here as we do not mention Brown's themed analysis. Does the reviewer mean the description of Braun and Clarke's thematic analysis? If so, we have expanded on this (p.7 line 136).
2. Explain the diagnoses if abbreviations are used, preferably written out in full.	Abbreviations of diagnoses have been written out in full for first use.

3. Write all abbreviations out in full	Abbreviations have been written out in full for first use. The use of RSE as an abbreviation has been removed.
4. Explain what is meant by an approach based on needs versus behaviour.	This has been further explained on p.14 line 286.
5. Discuss whether the recommendations at the end of the discussion would only or mainly apply to children and youngsters with SEND	We agree that many of these recommendations may apply to children more generally and this has been highlighted in the conclusions (p. 18, line 394)
6. Some recommendations concern supporting caretakers. What is the evidence that these caretakers are motivated to put in the effort to coach their children? Also Parents with children without SEND experience problems finding the time and the occasions to practice. Are the caretakers in this study motivated to take on those extra tasks?	This is an interesting point as practitioners often mention lack of parent engagement. This has been incorporated into the discussion on p.16, line 353 onwards.

Highlights

- Independent mobility is a source of anxiety for caregivers of children with SEND.
- Challenges were similar for 7-10 and 11-13 year-old children with SEND.
- Travel training should target specific behaviours rather than specific disorders.
- Home-school links should be utilised to promote consistent road safety messages.
- Travel training is a process not an event for children with SEND.

Promoting the Independent Mobility of Young People with SEND: The Lived Experience of Young People with Autism, ADHD, and Learning Difficulties

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We the undersigned declare that this manuscript is original, has not been published before and is not currently being considered for publication elsewhere.

We confirm that the manuscript has been read and approved by all named authors and that there are no other persons who satisfied the criteria for authorship but are not listed. We further confirm that the order of authors listed in the manuscript has been approved by all of us.

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Sincerely,

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Sarah Elizabeth O'Toole		06/01/2022	NONE
Rob Webster		07/01/2022	NONE
John Butcher		13/01/2022	NONE
Nicola Christie		13/01/2022	NONE

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Author Statement

Sarah E. O'Toole: Conceptualization; Data Curation; Formal Analysis; Funding acquisition; Methodology; Project administration; Writing - original draft; Writing - review and editing.

Rob Webster: Methodology; Writing - review and editing.

John Butcher: Methodology; Writing - review and editing.

Nicola Christie: Conceptualization; Funding acquisition; Methodology; Writing - review and editing.

1   **Abstract**

2   **Introduction:** Young people with special education needs and disabilities (SEND) are at

3   heightened risk of road traffic injury and their caregivers are often concerned about

4   independent mobility and the safety risks it poses. This qualitative research aimed to increase

5   understanding of the facilitators and barriers to independent mobility for 7-10 and 11-13 year-

6   olds with SEND.

7   **Methodology:** Thirteen young people (11 male and two female, six children 7-10 years-old

8   and seven children 11-13 years-old) diagnosed with autism, attention deficit hyperactivity

9   disorder (ADHD), or learning disabilities video recorded three journeys they regularly

10   undertook and then participated in a semi-structured interview with their caregiver. A thematic

11   analysis of travel films and interview transcripts was conducted.

12   **Results:** Younger children were typically not travelling independently, but both older and

13   younger children were anxious about independent mobility. Younger and older children with

14   SEND demonstrated unsafe behaviours in the road, had limited awareness at times of road

15   safety, may become overwhelmed, and required longer to process information.

16   **Conclusions:** The findings informed recommendations for how to effectively support the

17   independent mobility of young people with SEND. Children are often diagnosed with multiple

18   conditions, and it is the profile rather than the specific diagnosis that impacts their road safety.

19   Targeting specific behaviours rather than specific disorders may therefore be a more effective

20   approach. Road safety was a central concern for caregivers, but it was one aspect of

21   independent mobility and a broad focus on teaching independent mobility was preferable.

22   Support with independent mobility and road safety should be provided by a range of people

23   who come into contact with the young person and education may need repeating at key

24   transition points.

26 **1. Introduction**

27 A crucial part of achieving independence for all children and young people is having a good

28 grasp of road safety skills. Independent mobility is associated with a host of positive outcomes,

29 including social inclusion, access to employment, education and other services, improved

30 wellbeing and quality of live and increased autonomy (Berg & Ihlström, 2019; Kaufmann et

31 al., 2004; Thynell, 2017; Vella-Brodrick & Stanley, 2013). Added to this, being able to travel

32 around the local environment provides children with opportunities to develop their cognitive,

33 physical and social and emotional skills (Cox, 2020). However, the number of children

34 travelling independently has been declining; with caregivers often stating traffic, distance to

35 destination and personal safety as barriers (Cox, 2020). There may be some children who

36 experience more restrictions in relation to independent mobility than others, such as children

37 with special educational needs and disabilities (SEND).

38 Although understanding of the cognitive and behavioural challenges faced by children with

39 SEND in the traffic environment has increased (Williams, Savill, and Wheeler 2002), there

40 remains a need for research to address the needs of the 3.7% of the school population with an

41 Education, Health and Care Plan (EHCP) (DfE, 2021) who are at most risk, because the road

42 safety education is not sufficiently tailored to address their need and requirements (O'Toole

43 & Christie, 2019). While independent mobility has increased prominence in the SEND Code

44 of Practice (DfE, 2020), the potential that some children with learning disabilities, autism and

45 attention deficit hyperactivity disorder (ADHD) have of achieving this – and with it social

46 inclusion – is compromised by a lack of awareness of danger, locating potential hazards, and

47 their proneness to impulsiveness or difficulty in thinking and acting in the flexible ways

48   required to navigate and keep safe in the traffic environment (Graham et al., 2005; Williams

49   et al., 2002).

50   Behavioural road safety training has been found to be effective in improving concept

51   knowledge as well as behaviour and should be carried out from 4-5 years-old through to

52   adolescence (Dragutinovic & Twisk, 2006). This research though often does not evaluate the

53   effectiveness of training with SEND populations (O'Toole & Christie). Research suggests

54   that resources for typically developing children are often modified for use with children with

55   SEND (Williams et al., 2002). Parents have stated that road safety education often fails to

56   provide the extra assistance their children with SEND need and have suggested simpler

57   resources would be beneficial (Graham et al., 2005). However, adapting educational

58   resources for children with SEND is challenging (Klang et al., 2019; Webster & Blatchford,

59   2015). This reflects the debate regarding whether education more generally needs to be

60   adapted for children with SEND. Many teachers do not feel that they have the skills,

61   experience or resources to effectively educate children with SEND (OFSTED, 2004). The

62   view that tailored pedagogical approaches are needed for SEND has been widely critiqued

63   (Thomas & Loxley, 2001) and there has been a greater focus on identifying inclusive,

64   universal teaching approaches (UNESCO, 1994).

65   Research is needed to identify strategies that address the specific challenges children with

66   SEND face in learning road safety skills (Christie, 1995; Williams et al., 2002), and on effective

67   ways to teach them about road safety. This study aimed to increase understanding of the

68   facilitators and barriers to road safety education experienced by children between 7 and 13

69   years of age with SEND. Experiences of younger (8-10y) and older (11-13y) participants were

70   compared. There is a peak in road injuries around the secondary school transition (O'Toole &

71   Christie, 2018). Further, younger children may not be engaging in the same level of

72   independent mobility due to age. Although there is no legal age for children to walk to and

from school unaccompanied in the UK, a survey reported that most people felt this should not be until 10 years-old (YouGov, 2012). The Walk to School Campaign, however, support the view that parents should be responsible for deciding when their child is confident and capable to walk unaccompanied to and from school (https://www.livingstreets.org.uk/walk-to-school). There has been a greater reduction in the number of primary school aged children compared to secondary school aged children walking unaccompanied to and from school since 1970 (Shaw et al., 2012).

Road safety education for children across categories of SEND including learning disabilities (mild or moderate) and developmental disorders (ADHD or autism). This project aimed to provide a 'voice' to children with SEND and their caregivers by using an inclusive interview procedure. Children were given portable cameras to film three journeys and were then interviewed about these videos along with their caregivers. The video and interview data were used to identify facilitators and barriers to independent mobility and inform effective travel training methods.

2. Methodology

2.1. Participants

The sample included 13 participants (11 male and two female) between the ages of 7 and 13 years and their caregivers (Table 1). This included six participants between 7-10 years-old and seven children between 11 and 13 years-old. Participants were recruited via SEND charities and social media channels. Four participants were diagnosed with autism, two of whom had an additional diagnosis of pathological demand avoidance (PDA); three participants had ADHD; and six participants had a varied profile of disabilities. Six participants had EHCP.

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Table 1. Sample Characteristics

	ID	Gender	Age (years)	Ethnicity	Diagnoses	School
8-10y						
	A001	Male	9	White British	Autism, PDA	SEND
	A006	Male	7	White British	Autism, learning disability, sensory processing disorder, hypermobility	Mainstream
	AD001	Male	8	White British	ADHD	Mainstream
	AD002	Male	10	White British	Autism, ADHD, sensory processing disorder, hypermobility and epilepsy	Mainstream
	AD003	Male	9	White British	ADHD	Mainstream
	AD004	Female	8	White European	ADHD	Mainstream
11-13y						
	A002	Female	13	White British	Autism, mild LD	SEND
	A003	Male	13	Black British	Autism and Non-verbal	SEND
	A004	Male	11	White British	Autism and PDA	Mainstream
	A005	Male	11	White British	Autism, Polymicrogyria and epilepsy	Mainstream
	A007	Male	11	White Asian	Autism	Mainstream
	A010	Male	11	White British	Autism, ADHD, dyslexia	Unit in mainstream
	A011	Male	13	White British	Autism, learning disability, hemiplegia and epilepsy	SEND

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104   **2.2. Procedure**

105   Participants were provided with a wearable camera and asked to record three familiar journeys.

106   Participants and caregivers were then interviewed about the films and road safety and

107   independent mobility more broadly. This project received ethical approval. Informed consent

108   was obtained from caregivers and verbal consent was obtained from participants.

109   **2.3. Journey films**

110   Participants were asked to make and film a familiar journey, as they would usually travel (e.g.,

111   independently or accompanied by a caregiver; by route and mode of transport) without

112   modifying their typical language or behaviour. They were asked to focus on walking journeys

113   and to include a school/college journey where possible. The journey was filmed to capture

114   audio and visual data. The camera was either worn by the child (attached to a lanyard around

115   the neck) or operated by the caregiver.

116   **2.4. Semi-structured interviews**

117   Following the filming, children took part in a semi-structured interview about their journeys.

118   Caregivers participated in a separate semi-structured interview about the journey and their

119   child's independent mobility and road safety. Interviews were held within two weeks of filming

120   to facilitate participant recall.

121   The lead author reviewed the films and captured screenshots of significant scenes from the

122   films, such as those involving examples of safe and unsafe road behaviour, or an incident (e.g.

123   child failing to recognise presence of vehicle in car park, Figure 1). Each child was asked

124   questions about selected screenshots presented on a computer tablet, and questions on

125   independent travel and road safety (e.g. how do they travel, where to, and who teaches them

126   road safety). There were visual responses to questions on the tablet that children could select,

127   with support from the researcher. Where interviews were conducted via phone/video calling,

128   these documents were presented on screen or sent to the child (via their caregiver) prior to the

129   interview. Interviews with children lasted approximately 10-15 minutes.

130   Interviews with caregivers either face-to- face or via phone/video calling using a topic guide

131   that explored caregiver views on their child's independent mobility and road safety, plus their

132   involvement in their child's road safety and support from external parties. Interviews lasted

133   between 30-60 minutes. All interviews were audio recorded and transcribed verbatim.

134   [Figure 1 near here]

135   **2.5. Thematic analysis**

136   Following Braun and Clarke's thematic analysis approach (Braun & Clarke, 2006), thematic

137   analyses of film and interview data were carried. This process involved first coding segments

138   of data and then collating these codes in to overarching themes. Journey films were analysed

139   first. Video segments containing both visual and auditory information were coded. These codes

140   were then revised, and themes were created from code groupings. This coding framework was

141   then applied to interview transcripts.

142

143   **3. Findings**

144   Because of the variation in participants' SEND profiles, themes were explored across

145   participants, rather than across diagnoses. Further, it became apparent after analysis had

146   commenced that themes were reflective of the sample as a whole rather than diagnostic

147   categories.

148   Thematic analysis resulted in three main themes being identified: 1) Independent mobility; 2)

149   Child factors; and 3) Supporting children's independent mobility.

3.1. Independent Mobility

Perspectives on independent mobility. Caregivers of younger and older children wanted their child to be independent, including travelling independently, as they moved into adolescence. However, independent mobility and particularly road safety were major sources of anxiety and stress for caregivers. Caregivers felt they as well as their child needed to build confidence.

Younger children were typically not travelling independently, but most were undertaking some preparation towards independent mobility, though this varied greatly. Some younger and older children wanted to start making trips independently, whereas others (mainly diagnosed with autism) preferred to travel accompanied:

> *'......I am aware that some of his friends are doing things like going to the park on their own and that's not something I can see myself letting him do for several years because of the roads on the way there, but it's just starting to become relevant for him.' (Caregiver A004)*

Some caregivers felt that their child unlike their peers would not be progressing to traveling independently to school or with friends. Some caregivers felt their children were unlikely to travel independently in the future whereas others felt they may eventually be able to travel familiar routes independently.

Road Safety. Both safe and unsafe crossings were seen both at the road and at designated crossings (e.g. PELICAN, Zebra) in the video diaries. When crossing minor roads or vehicle accessways children more often failed to follow the highway code. There were incidents of participants stepping into the road to cross when there were oncoming vehicles. A few children reported having serious incidents in the road environment:

172 *'... basically I ran across the road because I was excited to go to the*

173 *park but [a car] was going fast; it slowed down but it didn't stop. It*

174 *tried to curve around me and that's why I ended up hitting it ... I mean I*

175 *was okay...I was crying but I wasn't crying so bad because it wasn't*

176 *that much of a hit.' (Child AD003)*

177 Caregivers of younger participants demonstrated inconsistent hand holding in the video diaries.

178 There was a tendency for caregivers to hold their child's hand more often when crossing the

179 road or in busier environments. Caregivers and children also interchanged who was walking

180 roadside.

181 **3.2. Child Factors**

182 *Awareness.* Both older and younger children were thought to understand road safety rules but

183 fail to implement them because they are distracted, consumed by their own interests, or

184 overwhelmed:

185 *'She would know that the road is danger but she wouldn't necessarily be*

186 *thinking about it...' (Caregiver A002)*

187 This was evident in video diaries as children were seen distracted by phones, magazines or the

188 environment. Caregivers were particularly concerned that children were often unaware of

189 danger, especially in car parks and had limited understanding of personal safety and personal

190 boundaries. Indeed, in their videos, children often walked near other pedestrians and cycled or

191 scooted on the pavement, weaving in-between pedestrians:

192 *'[He] is very comfortable speaking to adults, loves hugging people and*

193 *doesn't always think...' (Caregiver A001)*

194   ***Anxiety.*** Younger and older children were anxious about traveling independently as well as

195   about unexpected events, dogs, groups of young people or disorderly behaviour and this at

196   times overwhelmed them and they were unable to focus on road safety:

197   *'I think anxiety plays a part…very quickly if the situation isn't as he*

198   *expects, he will get to panic very quickly, whereas I observe that some of*

199   *his typical friends would think their way through it. I think his brain gets*

200   *overloaded and his nervous system kicks off faster...' (Caregiver A004)*

201   ***Cognitive abilities.*** Caregivers reported children required longer to process information and

202   had poor short-term memory. Sensory processing was challenging for children, particularly

203   with autism, and the majority found environmental noise overwhelming. Children with autism

204   were often described as very rules focused and followed the rules rigidly:

205   *'If there was one thing I don't really like it is most probably like all the*

206   *people in cars .. because they are like quite loud and it disturbs me.' (Child*

207   *A010)*

208   ***Impulsivity.*** Children's impulsivity reduced caregivers trust in their children's ability to

209   manage crossings independently. Caregivers, typically of younger children, discussed that they

210   could not always trust their children in the road environment because they would run off or run

211   across the road. Some children repeatedly asked caregivers if they could cross even when there

212   were oncoming vehicles or repeatedly pressed the button at PELICAN crossings:

213   *'...he knows what to do but I wouldn't trust him to do it on his own yet.*

214   *Because he just wouldn't have the patience – if he saw a gap I think he*

215   *would just go…' (Caregiver AD001)*

216

217

3.3. Supporting Children's Independent Mobility

218

219 Caregivers thought that road safety should be taught when children were motivated, in a

220 practical manner when they were out with children, and in small stages as it was easier for

221 children to focus and learn the lessons. Caregivers felt that teaching road safety would be a

222 gradual and sequential process and would involve reinforcing and repeating lessons to ensure

223 that children could remember road safety rules:

224 *'... if they're sitting in a class and they're like talking and obviously it's not*

225 *going in, I think it should be like more of a practical session like they do*

226 *with like bike riding and that sort of thing.' (Caregiver AD003)*

227 Caregivers coached children how to identify safe places to cross and how to safely cross

228 different road types and use road crossings. At crossings, caregivers often reminded

229 participants to wait, look, and ensure that vehicles had stopped prior to crossing. Caregivers

230 engaged with children; asking what they needed to do when crossing the road / using a crossing,

231 enabling children to demonstrate their knowledge and abilities. Caregivers felt independent

232 mobility required a lot of preparation, especially preparing their children for unforeseen

233 circumstances as they felt this would cause their anxiety and reduce their ability to safely

234 manage the situation.

235 Caregivers did not consistently teach children how to safely cross the road at each crossing,

236 despite highlighting the need for consistency in their interviews. There were occasions where

237 parents led the crossing and did not coach the participant. This may be because caregivers often

238 mentioned that children needed to be motivated to engage in road safety. Caregivers may be

239 tailoring their support based on child need:

240   *'I do try and get him to do it but it depends where he's at emotionally. He'll*

241   *often be like, "Uh, I'm not doing it," particularly on the way to school or*

242   *the way from school.' (Caregiver A004)*

243   **Variability.** Caregivers felt that children diagnosed with the same condition may vary

244   considerably and therefore it is not always appropriate to teach everyone in the same manner.

245   Caregivers felt that children's level of hyperactivity and concentration could vary across the

246   day or day to day and would alter the level of freedom they offered children in the road

247   environment based on how they were at the time:

248   *'... at the end of the day he'd be exhausted and it's then sometimes*

249   *irrational behaviour could come out.' (Caregiver A010)*

250   There was a slight tendency for caregivers of children attending SEND schools to report road

251   safety was not being taught or be unsure whether it was covered. A couple of caregivers of

252   children at SEND schools did report the school supporting children with accessing the

253   community and felt it may covered as part of this. Participants attending SEND schools were

254   more often in secondary school and this may account for the lower engagement with road safety

255   as it is more often a focus in primary schools.

256   **Resources.** Caregivers were not using any road safety resources. Caregivers felt that school

257   support with travel training was valuable as children were more likely to listen to their teachers:

258   *'... that it's being taught not just by a parent but by a teacher…children*

259   *have selective hearing to parents.' (Caregiver A010)*

260   Some caregivers and children reported the school did not teach road safety and some said the

261   school had taught road safety as part of social development or in more formal lessons. Some

262   caregivers were unsure whether the school had taught road safety or not.

263   ***Others.*** Family relatives also taught children road safety when they were out with them,

264   including grandparents and siblings providing other role models. Siblings were seen running

265   ahead, running across the road, texting while crossing the road, or walking on the edge of the

266   pavement. Children ran across the road when there was a crossing patrol officer. Caregivers

267   and grandparents were seen cycling on the pavement.

268

4. Discussion

270   Providing early support with independent mobility for children with SEND has a significant

271   social and economic impact; providing opportunities to socialise, engage with the community,

272   and travel to places of study or employment. In line with the finding that fewer primary school

273   aged children are walking to school (Cox, 2020), younger children were not travelling

274   independently in the present study. However, younger and older children were anxious

275   regarding travelling in their local community. There were few age-related differences. Overall,

276   younger and older children with SEND demonstrated unsafe behaviours in the road, had limited

277   awareness at times of road safety, may become overwhelmed, and required longer to process

278   information. The presence of SEND may result in a more protracted course of development of

279   the cognitive and social skills required for independent mobility. This is a pattern that may be

280   more characteristic of children with SEND. Typically developing children evidence gains in

281   their cognitive and behavioural control as they approach adolescence (Prencipe et al., 2011),

282   but children with SEND often continue to find cognitive and behavioural control a challenge,

283   which can impact their road safety (Tabibi, Schwebel & Zolfaghari, 2021).

284   Building on prior work that suggested inclusive universal education approaches are effective

285   (UNESCO, 1994), this research suggests that independent travel training should focus on

286   behaviours that children are presenting that may impact road safety and independent mobility

287 (e.g. anxiety or awareness of danger) across SEND diagnoses, rather than focusing on specific

288 SEND groups . Although there were some disorder specific behaviours (e.g. running ahead was

289 more common in an ADHD profile and wanting to be accompanied in the roads was more

290 common in an autism profile), these behaviours were not universal and children often had

291 multiple diagnoses with overlapping profiles and impacts on road safety. Further, the

292 presentation of these behaviours may vary with age (Steinberg, 2008). For example,

293 impulsivity in younger children may present as running across the road and in older children

294 as repeatedly pressing the button at the crossing. However, their impacts on safety are the same

295 e.g. crossing before it is safe to do so.

296 The findings highlighted some recommendations for effective travel training methods.

297 Caregivers wanted to support their children to be independent but felt they needed to build their

298 confidence and trust in their child's ability. Caregivers, generally, are worried about the

299 dangers of their children travelling in the local environment (Cox, 2020). This may be a more

300 prominent concern for caregivers of children with SEND due to the impacts of their conditions

301 on their road safety. Parents of children with SEND, unlike parents of typically developing

302 children, report that they are anxious of the impact of SEND on children's road and personal

303 safety (O'Toole & Christie, 2019). Further, children themselves, particularly those with autism,

304 were often highly anxious about independent mobility and resistant to travelling independently.

305 Children needed to be emotionally ready and motivated for travel training and training needed

306 to be tailored to an individual timeline. Children may be more engaged when they are

307 autonomously motivated (Reeve, 2002). That is, children will be more engaged and perform

308 better in independent travel training if their internal goals surround being independent. This

309 raises questions around whether parents and children themselves perceive independent

310 mobility as possible or safe in the context of their diagnoses; this is an important question for

311 future research.

312 Teaching road safety while out walking and in short bursts was felt to be the most effective

313 method in the context of children's limited attention, challenges with abstract constructs, and

314 limited information processing and memory capacity. Caregivers felt children often knew how

315 to cross the road but failed to implement this knowledge if they were distracted, impulsive, or

316 overwhelmed. Indeed, children with ADHD take longer to decide when to cross and

317 demonstrate more unsafe crossings than typically developing children (Tabibi et al., 2021),

318 indicating that failure to implement road safety knowledge is heightened in children with

319 SEND. Unforeseen circumstances (e.g. late bus) were sources of anxiety for caregivers and

320 children. Providing children with opportunities to practice road crossing and manage

321 unforeseen circumstances under the supervision of an adult may assist children in being able

322 to consolidate and adapt to different scenarios - an approach found to be effective with typically

323 developing children (O'Toole & Christie, 2019).

324 Caregivers, particularly those of children attending SEND schools, often reported a lack of

325 awareness of whether road safety was covered at school. Fantuzzo et al. (2004) found that

326 building links between school and home in teaching independent mobility may be effective as

327 caregivers believed children were more likely to listen to their teachers. Providing caregivers

328 with informal updates (e.g. via school diaries/parents evening) in relation to road safety skills

329 taught at school, especially if this is linked to aims and targets concerning to independence in

330 the child's EHCP, may facilitate these links. There were examples of the school reinforcing

331 road safety lessons when the caregiver reported an incident on the route to school. To further

332 support home-school links, 'homework' tasks could be set for families to complete in relation

333 to independent mobility (Ávila Daza & Garavito, 2009). These should be reflective of family's

334 needs (Howland, 2006) and could be easily undertaken during the walk to school (e.g. child

335 identifies which directions to look for cars when crossing).

336   Bridging home-school links would further ensure children are receiving correct and consistent

337   messages. Caregivers did not always coach children at every crossing and at times incorrectly

338   used crossings or demonstrated unsafe crossing behaviour. However, it is important to

339   differentiate between unsafe behaviour and higher-level road safety ability. An individual may

340   cross at a PELICAN without relying on the lights but cross safely. This may evidence higher

341   skill. Though, incorrect crossing use was often instigated by caregivers and not child led,

342   suggesting that it was not always evidence of children's skill progression. Thus, it is vital to

343   assess the skill level of the child to determine whether ideal crossing always needs to be

344   modelled and adhered to. A further reason for inconsistent behaviour in the road environment

345   may be due to child motivation to learn. Road safety education may provide a practical context

346   for children to develop cognitive, emotional and social skills. Thus, children's impulsivity and

347   enthusiasm may be chandelled in safe and productive way. For instance, when children are

348   learning self-regulation strategies (at school or home), road safety coaching may provide a real-

349   world practice context.

350   Other individuals, such as siblings, wider family, and crossing patrol officers, may represent

351   important role models/educators of road safety. Engaging with wider family and crossing patrol

352   officers to promote road safety may enable more consistent road safety messages to be passed

353   onto children. Prior research has found that parents often look to the school to provide road

354   safety education and there are often challenges in recruiting enough caregivers to support

355   school-based road safety training (O'Toole and Christie, 2019). Enlisting wider family and

356   crossing patrol officers would therefore address this issue. Future research exploring parent

357   views around who is responsible for teaching road safety (e.g. parents or schools) and

358   identifying motivations and barriers to parent road safety education would assist in unpacking

359   this finding.

360 *Limitations.*. The sample was diverse in relation to difficulties and disorders which prevented

361 needs-specific analysis, so the study may have overlooked the extent to which behaviours such

362 as impulsivity or attentiveness are a greater factor in the road safety education of children with

363 a specific need (e.g. ADHD) versus others. Further, visual and auditory impairments were not

364 considered in this project and the authors acknowledge that specific adjustments to independent

365 travel training may be required in relation to these impairments (Sauerburger & Bourquin,

366 2020). The sample reflects the gendered nature of SEND, which may mean gender differences

367 have been missed. We note, however, that in the general population males are more likely to

368 be killed or seriously injured on the roads (O'Toole & Christie, 2018). In addition, the study

369 did not include a control group on typically developing children. Future work should compare

370 the road safety behaviour of children with and without SEND in order to explore the similarities

371 and differences in more depth.

372 *Conclusions and Policy Implications.* Targeting specific behaviours may be a more effective

373 approach of teaching road safety than teaching to a particular need. That said, there is value in

374 further research involving a larger sample of children and young people to understand how

375 behaviours and traits such as impulsivity, distractibility and assessing risk, interact with road

376 safety, and use this evidence to inform a broader based road safety curriculum that is more

377 attentive to the needs of those with SEND. With the specific reference to independent mobility

378 in the updated SEND Code of Practice, greater support may be provided by schools (DfE,

379 2020). Promoting home-school links in relation to independent mobility may reinforce lessons

380 and ensure consistency. In line with the key point in the SEND Code of Practice (DfE, 2020)

381 that 'the transition to adulthood is not a one-off activity', independent mobility education may

382 need to be repeated throughout the child's life, especially at key transition points (e.g. transition

383 to college) as they may face new challenges. In this sense, road safety education for children

384 and young people with SEND is a process, not an event. It requires schools/caregivers to

385   provide on-going training, coaching and opportunities to practice road-crossing, in addition to

386   whole school or whole year group sessions. A number of actions would support children safe

387   independent mobility such a:

388   • Developing an assessment of child competence for caregivers and professionals to track

389   children's road safety level.

390   • Identifying others who can reinforce road safety lessons (e.g. siblings, crossing patrol

391   officers, teaching assistants).

392   • Providing a guide on skill areas to develop and how these may be impacted by specific

393   behaviours.

394   These recommendations are not necessarily specific for SEND populations. For example,

395   repeating road safety lessons across the lifespan, ensuring role models provide consistent

396   examples of safe behaviour and practical and gradual exposure to the roads have also been

397   found to be effective methods of teaching road safety to typically developing young people

398   (O'Toole & Christie, 2019). However, the benefits may be greater for young people with

399   SEND as they often demonstrate greater challenges processing when it is safe to cross and

400   more risky behaviour than their typically developing peers, especially in complex traffic

401   situations (Tabibi et al., 2021).

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Figure 1. Screenshots of child participant in carpark

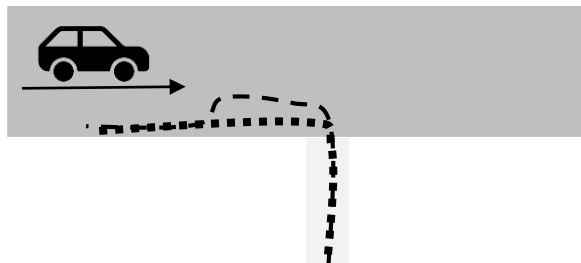2:35 Enter carpark

2:40 Turn left – looking down

2:41 Car approaching – child not looking

2:43 Car passes – child looks at car

2:44 Moves to left hand side – child not looking