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Challenging behaviour and its correlates in preschool-aged children with an intellectual disability in Saudi Arabia

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Abstract

Background Young children with an intellectual disability have a higher risk of developing challenging behaviour (CB). Early identification of risk factors for CB allows for earlier intervention. The aim of the current study was to assess the prevalence and correlates of CB in preschool-aged children with an intellectual disability in Riyadh (Saudi Arabia).
Methods One hundred twenty parents of preschool-aged (3–6 years old) children who had been diagnosed (DSM-5 criteria) with an intellectual disability completed an online cross-sectional survey that included demographic, CB and child adaptive skills measures. The relationship between CB and 15 potential correlates (e.g. gender and degree of disability) was examined using independent samples t-tests and chi-squared tests.
Results Most preschool-aged (3–6 years old) children with an intellectual disability exhibited CB (78.8%, 95% CI [70.3, 85.8]), with a 63.2% prevalence rate for self-injurious behaviours (95% C [53.8, 72.0]), a 57.6% rate for aggressive destructive behaviours (95% CI [48.2, 66.7]) and a 25% rate for stereotypy (95% CI [17.7, 34.0]). The likelihood of a child engaging in self-injurious and stereotyped behaviours was higher in those with autism and intellectual disability. Children with Down syndrome displayed fewer stereotyped behaviours. Low adaptive skill levels were associated with increased overall CB, self-injurious and stereotyped behaviours.
Conclusions The identified correlates of CB in this population and cultural context align with the international evidence base. Findings have implications for the importance of early systematic screening of CB in preschool-aged children in Saudi Arabia and other similar contexts. Preventative measures are suggested for preschool-aged children with an intellectual disability who are more likely to demonstrate CB, such as those with autism and poor adaptive behaviours.

Keywords Challenging behaviour, Intellectual disability, Preschool, Prevalence, Saudi Arabia

Introduction

A consensus in the international literature (Schroeder *et al.* 2014; Hoch *et al.* 2016; MacLean *et al.* 2020) indicates that young children with developmental or intellectual disability show more challenging behaviours (CB) compared to typically developing children. However, estimates of CB prevalence rates in young children with developmental or intellectual disability vary considerably, which could be due to

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differences in sampling methods or cultural context. In a cross-sectional and longitudinal large-scale population study, 67% of infants and toddlers with or at risk of an intellectual disability in Peru showed signs of aggression, self-injurious behaviours and stereotypies (Schroeder *et al.* 2014). According to research by Medeiros *et al.* (2012), 44.7% of toddlers with developmental disabilities in the USA displayed aggressive/destructive behaviour, 25% had stereotypies, and 16.1% showed self-injurious behaviours. More recent research in the USA (Soke *et al.* 2018) found that 12.4% of a large community-based sample of preschoolers with developmental delays and 29.4% with autism engaged in self-injurious behaviours.

Emerson and Einfeld (2011) define CB as 'frequent, intense, or lengthy behaviour(s) that is socially inappropriate and may put the person or others at risk or prevent the person from using social facilities' (p. 4). CB includes aggressive and self-injurious behaviours and also those high-frequency stereotypies that may negatively impact the individual's daily life, such as limiting or preventing their access to ordinary community settings. In addition to the adverse effects on children and others captured in the definition of CB, such behaviours may increase parental stress and reduce parents' self-efficacy (e.g. Stephenson *et al.* 2022). A longitudinal study (Kurtz *et al.* 2012) also indicated that young children with developmental disabilities who displayed self-injurious behaviours tended to develop further topographies of these behaviours over time. Therefore, early identification of children with CB is critical.

It is also crucial to understand the factors contributing to the occurrence of CB. Understanding potential risk factors may help in the earlier identification of at-risk children and direct early intervention efforts towards effective preventative measures, including function-based interventions (Harvey *et al.* 2009; Patterson *et al.* 2010). Existing research suggests several potential risk factors for CB in young children with an intellectual disability. Low communication skills have been found to be correlated with stereotypy (Schroeder *et al.* 2014) and self-injury (Kurtz *et al.* 2012). Stereotypy (Schroeder *et al.* 2014; Rojahn *et al.* 2016) and self-injury (Kurtz *et al.* 2012; Soke *et al.* 2018) were most common in children with co-occurring autism. Male children were more likely to display stereotyped behaviours (Schroeder *et al.* 2014; Rojahn *et al.* 2016). Lower cognitive ability has also been associated with more self-injury (Soke *et al.* 2018). Stereotypy and aggression were more common among children aged 37–48 months than among younger children aged 4–36 months (Schroeder *et al.* 2014). Higher parental education was correlated with aggression in children with an intellectual disability (Schroeder *et al.* 2014). Nicholls *et al.* (2020, 2023) found that the three subtypes of CB were correlated with a lower level of adaptive skills in children with an intellectual disability, while high stereotypy was linked with living in low-income areas (Nicholls *et al.* 2020).

Several Arab studies indicate that CB is prevalent among Arab children with an intellectual disability (Alqamsh 2006; Charfi *et al.* 2016; Aldabas 2021). For example, aggressive behaviour was reported in 80% of autistic Tunisian children aged 2–12 years with mild to moderate intellectual disability (Charfi *et al.* 2016). Several factors were found to be associated with aggression in Tunisian autistic children with an intellectual disability, including older age and co-occurring intellectual disability. Recent research (Aldabas 2021) also indicated that 40% of Saudi children with severe developmental disabilities (4–12 years old) showed significant stereotyped and repetitive behaviours. Positive correlations were confirmed between the type of disability (moderate to severe intellectual disability), gender (girls), age (8–12 years old) and the prevalence of CB in the study.

Overall, however, there is a scarcity of research on the prevalence of CB in Arab populations, specifically on preschool-aged Arab children with an intellectual disability. There are a few Arab survey studies (Alkuwaiti & Elkhamisi 2014; Alkharan 2016; Alqesuirien 2019; Jalal 2020) focusing on CB in young autistic children without a co-occurring intellectual disability, but none of these was limited to preschoolers. Existing research estimating the prevalence of CB in Arab populations with an intellectual disability is also methodologically limited due to relying mainly on non-standard measures of CB, typically researcher-developed questionnaires designed for a single study purpose (e.g. Allaheeb 2003; Alqamsh 2006; Aldabas 2021). Therefore, the current study adds to the literature by identifying CB and its correlates in preschool-aged children with an intellectual disability in Saudi

Arabia. We followed a robust, replicable methodology for identifying the presence of CB (Nicholls *et al.* 2020; Nicholls *et al.* 2023) and used a well-established measurement tool for CB: the Behaviour Problems Inventory—Short Form (BPI-S; Rojahn *et al.* 2012). The BPI-S is a tool developed in the USA and adapted to several different cultures and languages (e.g. French: Oubrahim & Combalbert 2019; and Japanese: Inoue *et al.* 2021).

Methods

Design

We used a cross-sectional design, examining the overall level of CB within Riyadh's preschool-aged children with an intellectual disability and potential demographic, socio-economic and adaptive behaviour correlates. Parents of these children were the key informants to assess CB. This was for three main reasons. First, family carers are the most engaged with their children at this age (3–6 years old) as these children spend most of their time at home. Second, not all children with an intellectual disability attend preschool in Saudi Arabia, so relying on preschool teachers as informants may capture only a part of the population. Third, we carried out this research during the COVID-19 pandemic. Saudi preschool teachers had no direct experience with their students' behaviour during the academic year 2020/2021 due to online teaching, a precautionary health measure approved by the Ministry of Education in Saudi Arabia to control the spread of COVID-19.

Settings

In Saudi Arabia, children with an intellectual disability are placed either in mainstream or special preschools based on the severity of their disability and the capacity of these preschools. Due to the COVID-19 outbreak during the data collection, some children with an intellectual disability might not have been attending preschool. Children with mild to moderate intellectual disability are taught alongside their typically developing peers in inclusive classrooms within mainstream preschools subsidised by the Ministry of Education. Children with moderate to profound intellectual disability are taught in special classrooms in private special preschools (known as day-care centres in Saudi Arabia). Eligible Saudi children with a disability receive financial support from the Ministry of Human Resources and Social Development (HRSD) to enrol in private day-care centres. The Ministry of Education supervises all mainstream preschools and a few special preschools, and the Ministry of HRSD supervises most special preschools (Aldabas 2015).

Procedure

The University of Warwick reviewed and approved the research project. The Saudi Ministry of Education, represented by the Education Department in Riyadh, also reviewed and approved the research project. Furthermore, the first author obtained the required permission from the Ministry of HRSD in Saudi Arabia to visit special preschools in Riyadh and contact preschool principals regarding the research project.

Inclusion criteria for the study included parents of children ages 3-6 who reportedly have an intellectual disability diagnosis and live in Riyadh, Saudi Arabia. Children with autism, Down syndrome or other diagnoses were included if an intellectual disability was present. Parents were recruited using a multi-point recruitment method. Initially, the first author contacted all eligible preschools in Riyadh and encouraged preschool principals to share the survey link with parents of preschool-aged children with an intellectual disability on their mailing list. Sixteen mainstream and 43 special preschools agreed to share the survey link with parents of children with an intellectual disability. The preschools reported that 853 children ages 3–6 with a confirmed intellectual disability diagnosis enrolled in these preschools; most (n = 789) attended special preschools. A diagnosis was typically obtained through preschool diagnostic teams or diagnostic centres.

Additionally, external organisations, charities, and support services for children with an intellectual disability in the city region were used to recruit parents whose children met our criteria and might not be in preschools. Support services and organisations were asked to share an advertising poster via email and social media posts, including the survey link. Three organisations and charities for people with disabilities agreed to distribute the survey with their network of families of children with an intellectual disability. Furthermore, to increase the sample size,

intellectual disability communities, groups, and professionals on social media were approached and asked to post the study advertising poster on their social media accounts.

Parents who qualified for our study were asked to complete an anonymous online survey (hosted by Qualtrics^{XM} - Experience Management Software, 2020) about their children with an intellectual disability behaviour. Informed consent from the participating parents was obtained before they could start the remainder of the anonymous online survey. The survey link included a participant information leaflet and consent form. We received 179 survey responses. However, 48 responses included only demographic information, and 11 had completed the adaptive behaviour questions only; thus, they were not included in the analysis. As a result, the analysed sample was 120 (67.03% of the responding sample) parents who provided key data on their child's CB. The data collection was begun in January 2021 and continued until September 2021.

Table 1 Characteristics of children with an intellectual disability

Characteristics of children with an intellectual disability		***n* = 120 (%)**
Gender	Male	80 (66.7)
	Female	40 (33.3)
Nationality	Saudi	103 (85.8)
	Other Arab	15 (12.5)
	Non-Arab	2 (1.7)
Age	3 years	31 (25.8)
	4 years	22 (18.3)
	5 years	30 (25.0)
	6 years	37 (30.8)
Level of intellectual disability	Mild	66 (55.0)
	Moderate	44 (36.7)
	Severe	8 (6.7)
	Profound	2 (1.7)
Presence of autism	Yes	25 (20.8)
	No	95 (79.2)
Presence of Down syndrome	Yes	60 (50)
	No	60 (50)
Presence of ADHD	Yes	22 (18.3)
	No	98 (81.7)
Presence of other diagnoses	Yes	16 (13.3)
	No	104 (86.7)

ADHD, attention-deficit/hyperactivity disorder.

Participants

The participating sample consisted of 120 parents of preschool-aged (3–6 years old) children with an intellectual disability. Children were predominantly Saudi Arabian (85.8%). Males comprised 66.7% of the sample, and 30.8% of the children were 6 years old. Half of the children also had Down syndrome (50%). 13.3% of the sample had other disabilities and health conditions, including Cri du chat syndrome, Joubert syndrome, Smith–Lemli–Opitz syndrome, DiGeorge syndrome, Smith-Magenis syndrome, Temtamy syndrome, Nager syndrome, atrophy, quadriparesis and motor disability. Just over half (55%) were reported to have a mild intellectual disability. Table 1 provides a summary of the characteristics of the study sample.

The mean family size of children with an intellectual disability was 6.04 (*SD* = 2.70), with a mean of 3.03 children (*SD* = 1.59) and 2.99 adults (*SD* = 1.69). Children living in apartments comprised 40% of the sample; nearly half of the sample (49.2%) resided in rented housing. Family income levels were estimated from factors such as house type and tenure. Families with a higher income were more likely to own a villa, representing 4.2% of the sample population. Three-quarters of the participating families (75%) were likely in middle-income households (residing in a rented villa or possessing other housing units). 20.8% of families were likely in low-income households (residing in non-owned housing units). Almost all fathers (98.3%) had paid jobs, with 55.8% working in the public sector. In contrast, 36.7% of mothers were employed, and 58.3% were homemakers. Just over half (53.3%) of the fathers had a high level of educational qualifications (i.e. undergraduate or postgraduate degrees)—likewise, 56.7% of mothers. The characteristics of the families of children with an intellectual disability are summarised in Table 2.

Measures

The survey included three sections: a demographic questionnaire, the BPI-S (Rojahn *et al.* 2012) and the GO4KIDDS Brief Adaptive Scale (Perry *et al.* 2015). The first author translated the survey into Arabic. A professional native proofreader verified the survey's Arabic version. Two bilingual (Arabic–English) professionals in Early Childhood Education and

Table 2 Characteristics of families of children with an intellectual disability

Characteristics of families		***n* = 120 (%)**	**Characteristics of families**		***n* = 120 (%)**
Total family members	2	2 (1.7)	Father's employment status	Working in the public sector	67 (55.8)
	3	16 (13.3)		Working in the private sector	27 (22.5)
	4	22 (18.3)		Self-employed	6 (5.0)
	5	19 (15.8)		Retired	17 (14.2)
	6	21 (17.5)		Unemployed	2 (1.7)
	7	12 (10.0)		Doing something else (private driver)	1 (0.8)
	8	10 (8.3)	Mother's employment status	Working in the public sector	32 (26.7)
	9	4 (3.3)		Working in the private sector	9 (7.5)
	10	4 (3.3)		On maternity leave	1 (0.8)
	11	5 (4.2)		Self-employed	2 (1.7)
	12	1 (0.8)		Unemployed	5 (4.2)
	13	1 (0.8)		Homemaker	70 (58.3)
	14	1 (0.8)		Missing	1 (0.8)
	15	2 (1.7)	Father's highest educational qualifications	No qualifications	6 (5.0)
Type of the family	Nuclear	98 (81.7)		Intermediate/high school education	50 (41.7)
	Extended	13 (10.8)		Diploma/bachelor's degree	54 (45.0)
	Single parent	7 (5.8)		Masters/doctoral degree	10 (8.3)
	Blended	2 (1.7)	Mother's highest educational qualifications	No qualifications	6 (5.0)
Type of housing unit	Villa	41 (34.2)		Intermediate/high school education	46 (38.3)
	Traditional house	3 (2.5)		Diploma/bachelor's degree	60 (50.0)
	A floor in a villa	21 (17.5)		Masters/doctoral degree	8 (6.7)
	A floor in a traditional house	6 (5.0)			
	Apartment	48 (40.0)			
	Other (government housing)	1 (0.8)			
Type of housing tenure	Rented	59 (49.2)			
	Owned	54 (45.0)			
	Provided by employer	4 (3.3)			
	Other (owned by the grandparents of the child)	2 (2)			
	Other (mortgage)	1 (0.5)			

Special Education back-translated the survey into English. The research team compared the original survey and back translations to identify translation correspondence, and then the research team discussed and resolved discrepancies.

The validity of the translated survey in terms of relevance to Arab cultures, particularly Saudi culture, was checked with two Arab researchers. The survey was also piloted twice on the targeted population identified from intellectual disability groups on social media. First, we piloted the survey paper version, initially intended to be completed by preschool teachers, with four special education teachers: two from a special preschool and two from a mainstream preschool. Second, as we moved to the parental-based data collection method due to COVID-19, we piloted the Qualtrics^{XM} version of the survey with three Saudi family carers after obtaining full ethical approval.

The piloting process examined the following: (1) the length of the survey; (2) the ease of answering all questions; (3) the appropriateness of questions to Arab culture; (4) the clarity of the survey's language and instructions; and (5) caregivers' willingness to share the requested information. The respondents' feedback was incorporated into the final version of the survey (e.g. the survey instructions were clarified).

Demographic questionnaire

The children's nationality, gender, age, degree of disability and presence of other diagnostic labels (e.g. autism) were obtained directly from their parents' reports via the survey. The socio-economic status of the child's family was also determined by collecting demographic information on the families relevant to the Saudi context. For example, the size and type of the child's family (e.g. nuclear; see Table 2 for detailed description), family income level, employment status and highest educational qualifications of the child's parents. Most demographic questions had several options, and some also had an open-ended response choice (i.e. the presence of other diagnostic labels, the type of housing unit and tenure and parents' employment status). All demographic variables were chosen because they might be correlated with CB or were indicators of variables that could be associated with CB.

The Behaviour Problems inventory—Short Form

The BPI-S (Rojahn *et al.* 2012) is used to assess CB in individuals with intellectual and developmental disability that have been present in the last 2 months. The BPI-S is a 30-item scale that measures the frequency and severity of CB across three types: 12 stereotyped behaviours (SB, e.g. rubbing self), 10 aggressive and destructive behaviours (ADB, e.g. hitting others) and eight self-injurious behaviours (SIB, e.g. self-biting). SB, ADB and SIB frequency is rated using a 5-point Likert scale (0–4), with four representing the highest frequency. ADB and SIB are also evaluated on a severity scale from 1 (*least severe*) to 3 (*most severe*).

The BPI-S is a reliable measurement tool with good psychometric properties (Rojahn *et al.* 2012) for adults with developmental disabilities. The original, longer version (BPI-01) has been validated with young children with an intellectual disability (Rojahn *et al.* 2013). The BPI-S includes a list of CBs similar to those listed in measures developed in Arabic research. Consequently, the BPI-S matches the Arab cultural concept of CB well, and the BPI-01 has also been used with Arabs in previous research (Charfi *et al.* 2016; Halayem *et al.* 2018).

In the current study, we used Nicholls *et al.'s* (2020) adapted version of the BPI-S (the BPI-S-Schools) that had some minor amendments to more closely suit the population of children with an intellectual disability—some commonly occurring behaviours were added, and one item re-phrased. Two items were added to the SIB subscale (self-pinching and skin-picking), and one item in the ADB subscale, bullying (being mean or cruel, e.g. grabbing toys or food from others), was amended to be grabbing items from others (e.g. toys or food). Nicholls *et al.* (2020) also used an 8-point frequency scale (0–7) to measure SB, with 7 representing the highest frequency. The BPI-S-Schools has good to excellent reliability in children with an intellectual disability, with .93 Cronbach's α for the total frequency scale and .90 for the overall severity scale.

The BPI-S-Schools needed to be translated into Arabic. We drew from the existing Arabic version of the BPI-01 (Halayem *et al.* 2018) and built up the forward translation of the BPI-S-Schools version from that existing translation. We slightly adapted the tool for Arab parents by providing explanations and

additional examples for some items. This ensured that the measure was understood in the same way in Arabic. Examples of non-food items were added to the pica item on the SIB subscale. A brief explanation was added to items 24 (manipulating objects), 28 (rubbing self) and 32 (grimacing) in the SB subscale.

To facilitate online completion, we also adapted the presentation of the BPI-S-Schools for parents. We first asked parents to indicate the presence or absence of each behaviour over the past 2 months since this time interval was suggested for one-time assessments (Rojahn *et al.* 2012). If the behaviour was reported as present, questions pertaining to its frequency and severity were displayed. Furthermore, we changed the order of the BPI by placing the SB subscale first and the SIB subscale last, as we expected SIB to be less prevalent in preschool children with developmental disabilities (Medeiros *et al.* 2012; Rojahn *et al.* 2013). The internal consistency was good for the BPI-S-Schools in the present study, with a Cronbach's alpha of .81 for the overall frequency scale and .86 for the total severity scale.

Coding of challenging behaviour

For coding CB, we employed the criteria Nicholls *et al.* (2020) provided in their working definitions of CB. At least one CB from the three types of behaviours (stereotyped, self-injurious, aggressive/destructive behaviours) was required to be present to indicate that the child has a 'CB'. Self-injurious and aggressive/destructive behaviours were considered 'challenging' when the behaviour met one of the following criteria: (1) It is rated as severe; (2) it is rated as moderate but occurs at least weekly; or (3) it is rated as mild but occurs at least daily. Stereotyped behaviour was considered 'challenging' if it occurred more than once per hour.

The GO4KIDDS Brief Adaptive Scale

The GO4KIDDS adaptive behaviour measure (Perry *et al.* 2015) is a brief research measure that assesses adaptive skills in children and adults with developmental disabilities. Eight adaptive abilities are evaluated and rated using a 5-point Likert scale, with 5 representing the highest skill level. These included the following: the need for assistance, the ability to understand and use spoken language, the willingness to interact with familiar adults and other children and the capacity for independent eating, toileting and clothing. The total summed score assesses the overall adaptive behaviour of children with an intellectual disability.

We used a version of the GO4KIDDS that included an additional question about the child's use of alternative communication methods (Nicholls *et al.* 2020) presented in a similar format to the original items and contributing to the total score. We also scored the three communication items (the ability to understand and use spoken language and the child's use of alternative communication methods) as a separate communication summed score.

We adopted the Arabic translation of the GO4KIDDS (Alallawi *et al.* 2022) with small copy edits to the translation of most items to ensure quality in translation and improve readability in Arabic. The eating skills item is culturally adapted because eating with hands and fingers is common in Arab cultures. Thus, the response options for the eating skills item were adjusted to (1) needs complete assistance with eating; (2) needs some assistance with eating; (3) eats independently with the right and left hand and fingers; (4) eats independently with the right hand and fingers or with the use of cutlery but may be messy; and (5) eats independently and appropriately with the right hand and fingers or with the use of cutlery. The GO4KIDDS total score has good internal reliability (Pan *et al.* 2019), which was also maintained for the present sample (Cronbach's α .82).

Data analysis

The collected data were analysed using IBM SPSS Statistics (version 27). Demographic data were cleaned and categorised into 14 dichotomous variables for analysis: nationality (Saudi vs non-Saudi), gender (male vs. female), age (3–4 years vs. 5–6 years), level of intellectual disability (mild vs. moderate-profound), presence of Down syndrome, autism and other diagnoses (yes vs. no), family size (six or fewer vs. seven or more—the average size of the Saudi family is 5.86 (General Authority for Statistics 2019)), family type (a single-parent vs. two-parent family), family income (low vs. middle to high-income), father's and mother's employment status (father/mother is in paid work vs. father/mother is not in paid work) and father's and mother's highest

educational qualifications (low level of or no qualifications vs. high level of qualifications).

We combined the housing unit and tenure variables to estimate the family's income level. According to the data published on the Saudi General Authority for Statistics (2018) website, the average monthly income of a homeowner family is the highest at 15 949 riyals, and the average monthly income of a family living in a villa is the highest at 20 045 riyals. Accordingly, categorisation for low-income families comprised neither owning their house nor residing in a villa. Since only 5% of families had a high income, a binary variable was created to distinguish between middle to high-income families and low-income families.

Regarding missing data in the participating sample following the deletion of 59 responses that included no CB information (see earlier), only one respondent missed demographic data (on the mother's employment status—reported as missing in Table 2). There were no missing adaptive skills data (GO4KIDDS data). However, three of the participating sample missed rating the frequency and/or severity of some CB items. Specifically, two did not provide enough information for the child to be coded in terms of overall CB, so were missing for this outcome. One parent missed reporting on stereotypy and self-injury but provided enough information for their child to be coded as having aggressive behaviour and thus also overall CB. When codes could not be applied, these four were deleted list-wise from analyses of that outcome.

Using the Nicholls *et al.* (2020) working definitions of CB, we computed frequencies for each CB type and the estimated 95% CI to obtain the prevalence of CB (overall and for each type). To examine potential correlates of CB, we performed univariate analyses of the association between the presence of CB (overall CB and its subtypes) and each possible correlate (i.e. demographic variables and adaptive behaviour scores). Specifically, we ran independent samples t-tests to identify any significant associations between adaptive behaviour scores (including the communication skills summed score) and the presence of CB (overall and for each type). We also used chi-squared tests to examine the associations between coded demographic variables and the presence of CB (overall and for each type). Given that these univariate analyses revealed few associations, we did not build regression models to examine the independent contribution of putative risk correlates to the prediction of CB.

Results

Prevalence of challenging behaviour

Most of the participating sample (78.8%, 95% CI [70.3, 85.8]) displayed at least one form of significant (overall) CB (n = 93). Self-injurious behaviour was the most prevalent CB subtype among our sample, with 63.2% (n = 74) (95% CI [53.8, 72.0]). Aggressive destructive behaviour was seen in 57.6% (95% CI [48.2, 66.7]) of the sample (n = 68). Stereotyped behaviour was the least common CB with a 25.2% (n = 30) (95% CI [17.7, 34.0]) prevalence. One in six (17.6%) preschool-aged children with an intellectual disability (95% CI [17.7, 34.0]) exhibited all three subtypes of CB. Table 3 summarises the prevalence of overall CB and its subtypes.

Table 3 Prevalence of challenging behaviour and its subtypes

Category	Frequency	Prevalence (%)	95% CI
Self-injurious behaviour (SIB)	74	63.2%	[53.8, 72.0]
Aggressive and destructive behaviour (ADB)	68	57.6%	[48.2, 66.7]
Stereotyped behaviour (SB)	30	25.2%	[17.7, 34.0]
Overall challenging behaviour	93	78.8%	[70.3, 85.8]
ADB and SIB	54	46.2%	[36.9, 55.6]
SB and SIB	25	21%	[14.1, 29.4]
ADB and SB	21	17.6%	[11.3, 25.7]
ADB, SB and SIB	21	17.6%	[11.3, 25.7]

Correlates of challenging behaviour

There were few significant associations between potential risk correlates and CB. Children with an intellectual disability and a co-occurring autism condition were more likely to have self-injurious behaviour ($\chi^2(1, n = 20) = 5.240$, $p = .022$) and stereotyped behaviour ($\chi^2(1, n = 14) = 17.494$, $p = .001$). In addition, children with an intellectual disability who had Down syndrome were less likely to exhibit stereotyped behaviour ($\chi^2(1, n = 7) = 11.773$, $p = .001$). Children with an intellectual disability from smaller families (with six members or fewer) were more likely to display aggressive behaviour ($\chi^2(1, n = 50) = 3.951$, $p = .047$).

Children with an intellectual disability and lower levels of adaptive behaviour were significantly more likely to have self-injurious behaviour ($t(115) = -2.200$, $p = .030$), stereotyped behaviour ($t(117) = -2.691$, $p = .006$) and overall CB ($t(116) = -2.421$, $p = .017$), and those with lower levels of communication skills, in particular, were more likely to engage in self-injurious behaviour ($t(115) = -2.074$, $p = .040$). No other associations with potential risk correlates were statistically significant (see Table 4).

Discussion

The prevalence of overall CB in preschool-aged children (3–6 years old) with an intellectual disability in Riyadh (Saudi Arabia) was 78.8% (95% CI [70.3, 85.8]). However, only 17.6% of preschool-aged children with an intellectual disability exhibited all three types of CB (aggression, self-injury and stereotyped behaviour), lower than international prevalence rates reported by other countries (e.g. 67% CB prevalence rate in young Peruvian children with or at risk of an intellectual disability; Schroeder *et al.* 2014), despite methodological differences. Existing research from Saudi Arabia and other Arab populations cannot be directly compared to this data due to differences in age profiles and measurement approaches. Only two studies (Charfi *et al.* 2016; Halayem *et al.* 2018) used the original longer version (BPI-01; Rojahn *et al.* 2001) with Arab participants. Charfi *et al.* (2016) reported a

Table 4 Univariate analysis for overall challenging behaviour and its subtypes

	Challenging behaviour			
Continuous correlates	**SIB** ***t* (*p*)**	**ADB** ***t* (*p*)**	**SB** ***t* (*p*)**	**CB overall** ***t* (*p*)**
Adaptive skills total score	**−2.200 (.030)**	−1.909 (.059)	**−2.817 (.006)**	**−2.421 (.017)**
Communication skills score	**−2.074 (.040)**	−.720 (.473)	−.681 (.497)	−.705 (.482)
Dichotomous correlates	Challenging behaviour			
	SIB χ^2 (*p*)	ADB χ^2 (*p*)	SB χ^2 (*p*)	CB overall χ^2 (*p*)
Nationality	3.031 (.082)	1.460 (.227)	.030 (.863)	2.950 (.086)
Age	.074 (.786)	.582 (.445)	.867 (.352)	.213 (.644)
Gender	.010 (.921)	.588 (.443)	.223 (.637)	.492 (.483)
Level of intellectual disability	.912 (.340)	1.360 (.244)	.068 (.795)	.040 (.842)
Presence of autism	**5.240 (.022)**	2.152 (.142)	**17.494 (<.001)**	1.361 (.243)
Presence of Down syndrome	.417 (.518)	.000 (1.000)	**11.773 (.001)**	1.269 (.260)
Presence of other diagnoses	.027 (.868)	.869 (.351)	2.805 (.094)	.166 (.684)
Family size	.015 (.904)	**3.951 (.047)**	.001 (.970)	.527 (.468)
Family type	.024 (.878)	.212 (.646)	.245 (.621)	.077 (.781)
Family income	1.794 (.180)	.528 (.468)	2.929 (.087)	.027 (.870)
Father's employment status	1.182 (.277)	.048 (.826)	.686 (.408)	.547 (.460)
Mother's employment status	2.038 (.153)	1.713 (.191)	.220 (.639)	.309 (.578)
Father's highest education qualifications	2.116 (.146)	2.539 (.111)	.139 (.709)	.376 (.540)
Mother's highest education qualifications	1.586 (.208)	.000 (.990)	.648 (.421)	.329 (.566)

ADB, aggressive and destructive behaviour; CB, challenging behaviour; SB, stereotyped behaviour; SIB, self-injurious behaviour.

higher prevalence of aggression (80%) in Tunisian autistic children with an intellectual disability (aged 2–12 years) than the current sample, with 57.6%.

Using clear and replicable definitions of CB (Nicholls *et al*. 2020) developed for school-aged children in different settings, the findings from the current study suggest that a large sub-group of preschool-aged children with an intellectual disability in this cultural context have CB. It is possible that these estimates are inflated by the fact that many young Saudi children with an intellectual disability could not attend preschools during the COVID-19 pandemic. However, data from similar child populations in the UK suggest that the overall impact of the pandemic on CB may be near-neutral (Bailey *et al*. 2021). Prevalence estimates may also be high due to participation biases (e.g. the study may have attracted more participation from families whose children exhibited more CB). The Arab literature further suggests that families may report higher rates of CB than professionals do (Alajami 2013; Albuqai & Alqudsi 2019).

We found a higher prevalence of self-injurious behaviours (63.2%) and fewer stereotypies (25%) in preschool-aged children with an intellectual disability. Given the potential developmental pathway from stereotypies to self-injury (Rojahn *et al*. 2016) and other research from Peru (Schroeder *et al*. 2014) suggesting that stereotyped behaviours are more prevalent in the early years, we had not anticipated this finding. This may be a genuine cultural difference that requires replication. Some Arab research (e.g. Albahnasawi & Abdel-Khalek 2020) described stereotyped behaviour as movements with no obvious purpose or function; therefore, stereotypies might be perceived as less challenging in this cultural context. In addition, we found that stereotypies were less common in children with an intellectual disability and Down syndrome. These children comprise half of the study sample, potentially reflecting Saudi Arabia's incidence rate of 1:554 live births with Down syndrome, which is greater than the global average (Niazi *et al*. 1995). Schroeder *et al*. (2014) also found that Peruvian children with Down syndrome showed lower rates of stereotypy than typically developing or autistic children.

The current study also confirms the findings of Schroeder *et al*. (2014), who reported that young children with or at risk for autism showed more self-injury and stereotypy than other children. Thus, the findings are similar to previous research (Charfi *et al*. 2016; Soke *et al*. 2018; Nicholls *et al*. 2020; Esteves *et al*. 2021; Nicholls *et al*. 2023) linking autistic traits to the risk of CB in children with an intellectual disability. Our findings further indicate that lower levels of adaptive skills are associated with an increase in stereotyped, self-injurious and overall CB (cf. Chadwick *et al*. 2000; Soke *et al*. 2016, 2017; Nicholls *et al*. 2020; Esteves *et al*. 2021; Nicholls *et al*. 2023). Lower levels of communication skills were also correlated with more self-injurious behaviours (cf. Kurtz *et al*. 2012). We also observed a statistically significant association between family size and aggressive destructive behaviour in preschool-aged children with an intellectual disability (smaller family size, increased aggressive behaviour). Children from smaller families may have fewer role models to interact with to learn social and communication skills that could help them form positive relationships with others—a factor that may be associated with reduced CB in general (Hastings *et al*. 2013). However, given multiple statistical testing in the present study, this may also represent a type I error.

The key strengths of the present study are the focus on a preschool-age population as well as clear and replicable data collection methods and CB ascertainment. Some limitations of this study should also be noted when interpreting the findings. Study results are based on an online survey, a single assessment point and parental reports rather than direct observations of children. Parental reports of their children's diagnosis and disability severity were not confirmed with clinical reports. The methodology employed in reporting CB also differs in key ways from other studies (e.g. different time-interval or measurement tools), meaning it is not appropriate to directly compare our findings of CB prevalence rates with previous research. Moreover, the study's data were collected during COVID-19, which may have affected children's CB. The children's behaviour may have increased due to disruption/changes in their daily routine or their health conditions that could not be monitored because of their vulnerability and the high demands placed on hospitals during COVID-19. Parents will also not have had as much opportunity to see their children interacting with people outside the family home and their CB in those contexts.

In addition, the recruited sample was unlikely to have been representative of preschool-aged children with an intellectual disability in Riyadh because of the overall low response rate compared to the data we had about the likely population. Further, the definition of CB includes those behaviours that may put the person or others at risk, including at risk of restricted community access. It is less clear whether stereotypy will meet such a definition. Indeed, many stereotyped behaviours serve an important function for the individual, helping them, for example, regulate their emotions. The BPI-S, in part, acknowledges this by classifying stereotyped behaviour as 'challenging' based on frequency only, and we applied a criterion that the behaviour would have to occur at high frequencies to be challenging. However, not all high-frequency stereotypies are likely to meet a definition of CB. Finally, our findings need to be confirmed in future research.

Future research is needed to replicate the current study, especially to understand if correlates we might have expected to be associated with CB (e.g. gender) are important in a Saudi context. Future research might also address which correlates contribute most to CB. The findings do suggest that autistic children with an intellectual disability may be at particularly high risk for CB and thus could be monitored to identify early signs of CB. The BPI-S-Schools appears to be a tool acceptable in the Saudi context, and the Arabic version tested in the current research could be used to identify children with an intellectual disability who have concerning levels of CB. In terms of implications for early intervention, focusing on developing adaptive skills may be an effective preventative measure for CB. For example, teaching young children with an intellectual disability better communication skills may reduce CB, where a lack of functional communication skills contributes to stereotypy (Schroeder *et al.* 2014) and self-injurious behaviours (Kurtz *et al.* 2012).

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Conflict of interest

We have no conflicts of interest to disclose.

Ethics statement

This study was reviewed and approved by the University of Warwick Humanities and Social Sciences Research Ethics Committee (HSSREC): 157/19-20. It has also been approved by the Ministry of Education in Saudi Arabia (D-85520).

Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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