



## Short report: Correlates of behaviours that challenge in children with intellectual disability in special education settings

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### ABSTRACT

**Background:** Understanding the correlates of behaviours that challenge (CB) can help in both identifying children with intellectual disabilities (ID) at risk of developing CB and designing support programmes and interventions.

**Aims:** This study explores the correlates of CB exhibited by children with ID in special educational settings in the UK.

**Methods and procedures:** Data on behaviours that challenge were provided by educators of 71 children with ID. Additional measures of adaptive and pro-social behaviours, maternal anxiety, depression, and stress, and demographic variables were included in the cross-sectional binary logistic regression analyses.

**Outcomes and results:** Results showed that pro-social behaviours of children with ID were associated negatively with overall CB (OR=0.72, 95% CI [0.62, 0.84],  $p < 0.001$ ), stereotyped (OR=0.81, 95% CI [0.70, 0.94],  $p = 0.005$ ), self-injurious (OR=0.80, 95% CI [0.70, 0.90],  $p < 0.001$ ), and aggressive/destructive behaviours (OR=0.79, 95% CI [0.69, 0.90],  $p < 0.001$ ). Stereotyped behaviours were associated with lower adaptive skills (OR=0.95, 95% CI [0.91, 0.99],  $p = 0.026$ ) and male gender (OR=9.20, 95% CI [1.07, 79.44],  $p = 0.044$ ). Aggressive/Destructive behaviours were associated with maternal stress (OR=0.82, 95% CI [0.70, 0.97],  $p = 0.022$ ), and increased maternal anxiety (OR=1.21, 95% CI [1.00, 1.47],  $p = 0.050$ ) was a marginally significant predictor of self-injurious behaviours.

**Conclusions and implications:** The findings of this study emphasise the potential role of pro-social and adaptive behaviours, gender of children with ID, and maternal stress, as factors associated with CB in special education settings. Therefore, the present study contributes to extending the literature on correlates of CB for children with ID in special education settings while adopting an evidence-informed methodology for defining and measuring CB that facilitates replicability and allows for comparisons across findings of studies that explore CB thus increasing a more coherent evidence-base regarding assessment of CB.

### What this paper adds?

The findings of this study highlight the significant negative association between pro-social behaviours and all topographies and

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overall presence of behaviours that challenge, and associations between specific correlates with distinct topographies of behaviours that challenge. The findings demonstrate the importance of taking into consideration maternal mental health factors such as maternal stress, which although not directly associated with the special education setting, can be associated with the presence of behaviours that challenge in these settings. Better understanding of these associations may help identify children in special education settings at risk of developing behaviours that challenge as well as informing appropriate supports that can enhance their quality of life, and lead to reductions in behaviours that challenge. Additionally, the present study contributes to increasing the number of studies available that utilise a clearer evidence-informed methodology to define and assess behaviours that challenge in special education settings facilitating replicability and feasibility of potential comparisons across studies.

## 1. Introduction

Children with intellectual disability are at risk of exhibiting behaviour that challenges (Hastings et al., 2013). These behaviours can have a significant negative impact on their quality of life by limiting life opportunities and by posing a barrier to accessing education provision, as well as impacting negatively on other people in education settings such as staff members and peers (Kelly et al., 2007). Behaviours that challenge were defined by Emerson (2001) as behaviours that are considered culturally inappropriate and can have adverse effects for the person exhibiting them or others because of their frequency, intensity, or long duration. More specifically, these are behaviours that can endanger the physical health of the person who exhibits them or others, or behaviours that can lead to the minimisation of use, or exclusion from the use, of communal amenities for the person.

Many children with intellectual disability in special education settings may engage in behaviours that challenge. A recent study in a special school in England demonstrated high prevalence rates for behaviours that challenge, as measured by the BPI-S (Rojahn et al., 2012), with 53% of the pupils exhibiting at least one behaviour that challenges, 36.4% exhibiting self-injurious behaviour, 30.2% exhibiting aggressive/destructive behaviour, and 25.9% exhibiting stereotyped behaviour (Nicholls et al., 2020). Previous research investigating the prevalence of behaviours that challenge (Murphy et al., 2009), as measured by the BPI-01 (Rojahn et al., 2001), found a higher percentage for the presence of behaviours that challenge estimated at around 82%, but a less strict definition for the presence of behaviours that challenge was applied compared to the Nicholls et al. (2020) study. The lack of consistency in defining and measuring behaviours that challenge in the existing literature highlights the need for more studies to start adopting similar methodological approaches when assessing behaviours that challenge.

The high prevalence rates of behaviours that challenge in special education settings, indicate the need to learn more about the factors associated with the likelihood of occurrence for these behaviours, so that preventative measures can be implemented. Research investigating the variables associated with behaviours that challenge has demonstrated a negative association with adaptive skills (Nicholls et al., 2020) and pro-social behaviours (Rojahn et al., 2012) for children with intellectual disability. Moreover, a positive association between behaviour problems and parental stress is demonstrated by research (Hastings, 2003; Neece et al., 2012). Additionally, Rose et al. (2016) reported the presence of associations between maternal stress and behaviours that challenge for children and young adults with intellectual disability. Evidence on the association between demographic characteristics, such as gender, age and diagnosis, and behaviours that challenge for children enrolled in a special education setting found that autism diagnosis and socio-economic deprivation were associated with behaviours that challenge (Nicholls et al., 2020). However, there was no association between age or gender and behaviours that challenge (Murphy et al., 2009; Nicholls et al., 2020).

The present study aims to identify correlates for overall and different topographies of behaviours that challenge exhibited by children with intellectual disability in special education settings in the UK. Moreover, the present study aims to address issues with lack of consistency in the way behaviours that challenge is assessed in the literature by increasing the existing number of studies that adopt the same methodological approach, formulated based on research evidence, when defining and measuring behaviours that challenge in order to create a more coherent evidence-base. Multiple correlates of challenging behaviours were investigated, including family context and parent well-being factors and pro-social behaviour, which are factors not often studied in the context of special education settings. Therefore, this study extended the existing literature on correlates of behaviours that challenge of children with intellectual disability, enrolled in different special education settings, by examining the significant role of child-related variables such as pro-social behaviours in the educational setting with behaviours that challenge alongside family context and parent well-being factors such as maternal stress.

## 2. Material and methods

### 2.1. Participants

The study focused on a sample of 71 children with intellectual disability. The age of the children ranged from 4 to 18 years old (mean = 10.04 years), they were all enrolled in special education settings (n = 20 schools) in the UK, and 43 (60.6%) were male.

### 2.2. Measures

The variables included in the analyses were demographic characteristics (age, gender, presence of autism, presence of Down syndrome, socio-economic status index), pro-social behaviours, adaptive skills and maternal stress, anxiety, and depression. Data on behaviours that challenge were provided by educators for 71 children with intellectual disability drawn from a larger study of families of children with severe intellectual disability (Hastings et al., 2005). Educators also provided data on pro-social behaviours of the

**Table 1**  
Logistic Regression Analyses for Overall Behaviours that Challenge (CB) and Stereotyped Behaviour (STB).

Variable	CB						STB					
	B	Wald	df	Sig.	Odds ratio Exp (B)	95% C.I. for Odds ratio Exp (B)	B	Wald	df	Sig.	Odds ratio Exp (B)	95% C.I. for Odds ratio Exp (B)
Gender	0.518	0.416	1	0.519	1.678	[0.348, 8.094]	2.219	4.071	1	0.044	9.201	[1.066, 79.442]
Autism diagnosis	0.722	0.764	1	0.382	2.059	[0.408, 10.393]	1.603	3.653	1	0.056	4.966	[0.960, 25.688]
Pro-social behaviours	-0.331	17.406	1	< 0.001	0.719	[0.615, 0.839]	-0.208	7.804	1	0.005	0.812	[0.702, 0.940]
Adaptive skills	-	-	-	-	-	-	-0.052	4.938	1	0.026	0.950	[0.908, 0.994]

Note. CB: Cox and Snell R Square 0.464, Nagelkerke R Square 0.624

STB: Cox and Snell R Square 0.442, Nagelkerke R Square 0.627

**Table 2**  
Logistic Regression Analyses for Self-injurious Behaviour (SIB) and Aggressive/Destructive Behaviour (ADB).

Variable	SIB						ADB					
	B	Wald	df	Sig.	Odds ratio Exp (B)	95% C.I. for Odds ratio Exp (B)	B	Wald	df	Sig.	Odds ratio Exp (B)	95% C.I. for Odds ratio Exp (B)
Pro-social behaviours	-0.228	12.803	1	< 0.001	0.796	[0.702, 0.902]	-0.241	12.748	1	< 0.001	0.786	[0.688, 0.897]
Stress of mother	–	–	–	–	–	–	-0.196	5.246	1	0.022	0.822	[0.695, 0.972]
Anxiety of mother	0.193	3.849	1	0.050	1.212	[1.000, 1.470]	–	–	–	–	–	–

*Note.* The significance level for anxiety and SIB is at 0.050 and confidence intervals have values of 1.

SIB: Cox and Snell R Square 0.305, Nagelkerke R Square 0.424

ADB: Cox and Snell R Square 0.341, Nagelkerke R Square 0.463

children. Data on maternal stress, anxiety and depression were provided by the mothers of the children with intellectual disability. The adaptive skills measure was administered to the mothers of the children, who provided information about the adaptive skills of their child.

The frequency and severity of self-injurious, stereotyped, and aggressive/destructive behaviours were measured using the Behavior Problems Inventory (BPI-01; [Rojahn et al., 2001](#)). Adaptive functioning across four domains (Socialization, Communication, Daily Living Skills, and Motor Skills) was measured using the Vineland Adaptive Behavior Scales (VABS; [Sparrow et al., 1984](#)). Pro-social behaviours were measured using the Nisonger Child Behavior Rating Form (NCBRF; [Aman et al., 1996](#)). Maternal stress was measured using the Friedrich Short Form of the Questionnaire on Resources and Stress (QRS-F; [Friedrich et al., 1983](#)). Additionally, maternal anxiety and depression were measured using the Hospital Anxiety and Depression Scale (HADS; [Zigmond & Snaith, 1983](#)).

### 2.3. Statistical analysis

Statistical analyses were performed using SPSS version 27.0. The definition used by [Nicholls et al. \(2020\)](#) for behaviours that challenge was applied to the BPI-01 data to define presence or absence of challenging behaviour. In brief, self-injurious and aggressive/destructive behaviours were coded as challenging behaviours if they were rated as being mild and occurring at least daily, or if they were rated as being moderate and occurring at least on a weekly basis, or if they were rated as being severe. Stereotyped behaviours were rated as challenging behaviours if they were rated as occurring hourly. If at least one topography of behaviours that challenge was present, then an overall behaviours that challenge code was also applied. This definition was chosen to ensure that the study would employ a clear replicable methodology for defining and measuring behaviours that challenge in special education settings that is based on relevant prior research involving clinical experience and the definition of behaviours that challenge ([Nicholls et al., 2020](#)), and which takes into consideration the frequency and severity of behaviours that can impact the person and/or others to classify them as challenging ([Emerson, 2001](#)).

The main analyses were binary logistic regression models. In total, four binary logistic regression models were fitted with a model for each one of the three topographies of behaviours that challenge outcomes and one model for overall behaviours that challenge. To select predictors for each model, bivariate associations were explored between all potential correlates and each challenging behaviour outcome. Potential correlates were identified as eligible for inclusion by taking into consideration variables that previous literature indicated are associated with the presence of overall or a specific topography of behaviours that challenge; and which had also shown an association at a statistically significant level in the bivariate analyses conducted. Checks for collinearity, based on the Variance Inflation Factor (VIF), tolerance and correlation coefficient values for association level between the correlates, showed no evidence of multicollinearity for the correlates of each logistic regression analysis. More specifically, VIF values were below 10 for the correlates, tolerance values were over 0.1, and the bivariate correlation coefficient values for the association of the correlates did not include any values exceeding 0.7.

## 3. Results

Thirty-eight (53.5%) children exhibited at least one behaviour that challenges. Twenty-two (31%) children in the sample exhibited self-injurious behaviour, 20 (28.2%) exhibited stereotyped behaviour, and 28 (39.4%) exhibited aggressive/destructive behaviour. Fourteen (19.7%) children exhibited both aggressive/destructive and self-injurious behaviours, 13 (18.3%) children exhibited both aggressive/destructive and stereotyped behaviours, 14 (19.7%) children exhibited both self-injurious and stereotyped behaviours, and nine (12.7%) children exhibited all three topographies of behaviours that challenge.

A summary of the results for the four logistic regression analyses conducted to examine correlates of the presence/absence of each type of challenging behaviour can be found in [Tables 1 and 2](#).

The logistic regression analyses showed that higher levels of pro-social behaviours were associated with a decreased likelihood of overall behaviours that challenge (OR=0.72, 95% CI [0.62, 0.84],  $p < 0.001$ ), self-injurious behaviours (OR=0.80, 95% CI [0.70, 0.90],  $p < 0.001$ ), aggressive/destructive behaviours (OR=0.79, 95% CI [0.69, 0.90],  $p < 0.001$ ) and stereotyped behaviours (OR=0.81, 95% CI [0.70, 0.94],  $p = 0.005$ ). Moreover, the logistic regression analyses showed that higher levels of adaptive skills were associated with a decreased likelihood of stereotyped behaviours (OR=0.95, 95% CI [0.91, 0.99],  $p = 0.026$ ). Additionally, male gender was associated with an increased likelihood of stereotyped behaviours (OR=9.20, 95% CI [1.07, 79.44],  $p = 0.044$ ).

Regarding the correlates related to the family context and parent well-being factors, the logistic regression analyses showed that higher levels of maternal stress were associated with an increased likelihood of aggressive/destructive behaviours (OR=0.82, 95% CI [0.70, 0.97],  $p = 0.022$ ). Furthermore, higher levels of maternal anxiety were associated at a marginal level of statistical significance with an increased likelihood of self-injurious behaviours (OR=1.21, 95% CI [1.00, 1.47],  $p = 0.050$ ).

## 4. Discussion

### 4.1. Main findings

The current study showed a negative association between pro-social behaviours and overall behaviours that challenge, self-injurious, stereotyped and aggressive/destructive behaviours of children in special education settings in the UK. This finding is in line with previous research ([Rojahn et al., 2012](#)). The current study also showed a significant independent association between maternal stress and aggressive/destructive behaviours of children, and a marginal association between maternal anxiety and

self-injurious behaviours of children in special educational settings. This positive association is evident in previous research that investigated parental stress and psychological distress and child behaviour problems (Hastings, 2003; Neece et al., 2012) and behaviours that challenge of children with developmental disabilities (Rose et al., 2016).

Lower adaptive skills were associated in this study with stereotyped behaviours. This finding is in line with previous research in special school populations (Nicholls et al., 2020) although previous research showed associations between adaptive skills and all topographies of behaviours that challenge, which was not the case for this study. It is not clear why associations were not found between other topographies of behaviours that challenge and adaptive skills. One possible reason may be that different measures were utilised to assess adaptive skills in previous research. Additionally, it is possible that the children in the current study may have had a more restricted range of adaptive skills compared to previous research. Regarding the associations between demographic characteristics and behaviours that challenge, Nicholls et al. (2020) and Murphy et al. (2009) did not find an association between gender and behaviours that challenge of pupils in special education settings. However, the current study showed an association between gender and stereotyped behaviours in special education settings.

#### 4.2. Study strengths and limitations

This study took into consideration for the analyses a variety of factors that previous research has suggested are correlates of problem behaviours in general and behaviours that challenge specifically. The clarity of the methodological procedures and consistency with previous research of definitions applied, that can facilitate replicability, are additional strengths of this study. The cross-sectional analyses employed offered useful information regarding the relationship between different topographies of behaviours that challenge and pro-social behaviours, adaptive skills, gender, and maternal stress and anxiety. Causality, however, has not been established and the relationships identified in the current research need to be tested in prospective designs. When considering the interpretation of the results of the current study the sample size needs to be taken into consideration. The sample size of 71 was unlikely to be large enough to identify small associations. Additionally, data about a wider range of variables need to be collected by future research, such as special education setting related data, which were not available in the dataset utilised for this study.

#### 4.3. Implications and future directions

The study results draw attention to potential risk factors that need to be considered during assessment and when designing and implementing proactive support to increase the quality of life of children in special education settings. Decreased pro-social and adaptive skills of children, and maternal stress may be important risk factors, as highlighted by the results of the current study. Taking into consideration the presence or absence of these potential risk factors for behaviours that challenge could improve assessment procedures for identification of at-risk groups. These children may require additional proactive support to have their needs met so that they will not have to resort to exhibiting behaviours that challenge to fulfil those unmet needs.

Support in developing the pro-social skills of children may be beneficial in terms of contributing to preventing and decreasing overall and distinct types of behaviours that challenge in the context of educational settings. Thus, special education settings should incorporate teaching programmes that focus on the development of essential skills such as pro-social skills. Additionally, the significant association between maternal stress and aggressive/destructive behaviours of children emphasises the importance of adopting a more holistic approach, that takes into consideration maternal mental health, in addition to the level of skills that children demonstrate in their special educational setting. Therefore, collaboration between family carers and school staff is essential when considering the factors associated with the presence of behaviours that challenge of children, so that appropriate support is designed and implemented. Data on special education setting related variables need to be collected by future research (such as size of the educational setting and their classes, years in special education setting and prior type of setting before enrolling to the special education setting and so on) so that a more comprehensive understanding of correlates of behaviours that challenge can be achieved.

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#### CRedit authorship contribution statement

**Lorena Beqiraj:** Conceptualization, Methodology, Formal analysis, Data curation, Writing – original draft, Project administration.  
**Louise D. Denne:** Conceptualization, Methodology, Writing – review & editing, Supervision, Project administration, Funding acquisition.  
**Richard P. Hastings:** Conceptualization, Methodology, Investigation, Resources, Formal analysis, Writing – review & editing, Supervision, Project administration, Funding acquisition.

#### Declarations of Interest

None.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Data availability

Due to the sensitive nature of the information contained in the dataset that has been used for this secondary data analysis study, data must remain confidential.

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