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Prevalence and putative risk markers of challenging behavior in students with intellectual disabilities

Wolfgang Dworschak [a], Christoph Ratz [b,*], Michael Wagner [c]

[a] University of Munich, Germany
[b] University of Würzburg, Germany
[c] University of Koblenz-Landau, Germany

A R T I C L E   I N F O

A B S T R A C T

Numerous studies have reported a high prevalence of challenging behavior among students with intellectual disabilities (ID). They discuss different putative risk markers as well as their influence on the occurrence of challenging behavior. The study investigates the prevalence of challenging behavior and evaluates in terms of a replication study well-known putative risk markers among a representative sample of students with ID ($N = 1629$) in Bavaria, one of the largest regions in Germany. The research is based on a modified version of the Developmental Behavior Checklist (DBC). Findings indicate a prevalence rate of 52% for challenging behavior. The following putative risk markers are associated with challenging behavior: intense need for care, male gender, lack of communication skills, and residential setting. These risk markers explain 8.4% of the variance concerning challenging behavior. These results reveal that challenging behavior either is to a large extent determined by situations and interactions between individuals and environment and cannot be explained by the measured individual and social risk markers alone, or it is determined by further risk markers that were not measured.

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1. Introduction

Numerous studies report that challenging behavior, defined as a deviant level of emotional or behavioral problems, is widespread among persons with intellectual disabilities (ID; Matson et al., 2011). Based on research carried out over the past 40 years, Alimovic (2013) summarized that the prevalence of challenging behavior is three to seven times higher among people with ID than among typically developing children and adolescents. Several putative risk markers such as gender, age, degree of ID, and autism spectrum disorder (ASD) have been discussed (Einfeld, Ellis, & Emerson, 2011; Felce & Kerr, 2013; McClintock, Hall, & Oliver, 2003).

Therefore, the following questions arise: Which putative risk markers increase the likelihood of challenging behavior among students with ID from a large representative sample, and how important are these factors? The current study, representing a replication study, addresses these questions and presents prevalence rates as well as putative risk markers among a representative sample in Bavaria, Germany.

The term *challenging behavior* has been discussed using various definitions thus leading to a substantial variety of prevalence rates. Koritsas and Iacono (2012a) presented an overview of numerous definitions, timeframes, and topographies of

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various studies that explain such different results. The current study refers to the same definition of behavioral and emotional disorder as used by Einfeld and Tonge for the Developmental Behavior Checklist (DBC):

Where behavior and emotions are abnormal by virtue of their qualitative or quantitative deviance, and cannot be explained on the basis of developmental delay alone and cause significant distress to the child carers or the community, as well as significant added impairment, then these behaviors and emotions are regarded as disordered (Einfeld & Tonge, 1995; p. 87).

The DBC is completed by parents or caregivers and assesses the behavior of children or adolescents. Einfeld and Tonge (1996) used it to interview 454 parents and caregivers in North South Wales (Australia). The study revealed that 40.7% of the children age 8–18 showed severe emotional and behavior disorder. Cormack, Brown, and Hastings (2000) used the DBC in a regional school sample with 123 children age 4–18. In this study, parents carried out the assessment, which showed that 50.4% of children were above the cutoff mark. Molteno, Molteno, Finchilescu, and Dawes (2001) interviewed the teachers of 355 children attending special schools in Cape Town, South Africa, with the Developmental Behavioral Checklist–Teacher Version (DBC–T). The prevalence rate in this study was reported as 31%.

Studies investigating challenging behavior in children with ID often apply the Child Behavior Checklist (CBCL; Achenbach & Rescorla, 2001). As with the DBC, the CBCL assesses children by interviewing parents or caregivers. The Teachers Report Form (TRF), a special version for assessment with teachers, also has been developed. Dekker, Koot, van der Ende and Verhulst (2002) used the parent and teacher version of the CBCL in a study of 2896 children in the Netherlands, 1041 of them with ID and 1855 without ID. Parents completed the CBCL, while teachers filled in the TRF. Here, 50% of the children with ID showed results above the cutoff, in comparison to 18% of those without ID.

Gosch (2004) conducted a smaller German study ($N = 111$) in which mothers completed the CBCL. Sixty-three percent of the children with mild or moderate ID were above the cutoff ($n = 25$). Likewise, using the CBCL in Berlin, Germany, Soltau, Biedermann, Hennicke, and Fydrich (2015) asked teachers of specialized schools for ID to complete the TRF. They gathered information from some 1226 children and adolescents with mild to profound ID. Initially, 52.4% of them were above the cutoff mark; however, three items reflecting cognitive deficits were deleted, and the prevalence rate dropped to 47.1%.

Regarding risk markers for challenging behavior, Alimovic (2013) and Dekker et al. (2002) both described the risk of developing challenging behavior as three to four times higher for children with ID than for those without ID. McClintock et al. (2003) conducted a meta-analysis of studies from the past 30 years and found the following risk markers: gender, age, degree of ID, ASD, degree of communicative impairment, degree of motor impairment, and degree of sensory impairment. An empirical secondary analysis of these studies showed severity of ID, ASD, and poor communication ability as risk markers for challenging behavior.

Gosch (2004) found the degree of ID and the extent of behavior problems in childhood to be significant risk markers. In the study ($N = 111$), gender, birth weight, and socioeconomic status (SES) of the family did not prove to be significant. According to the applied regression model, 45% of the variance could be explained in this study. In a literature review of nine studies addressing the comorbidity of ID and mental disorder in children and adolescents, Einfeld et al. (2011) pointed out that possible risk markers are age, gender, severity of ID, and SES. These studies, however, are inconsistent with regard to the individual statistical results of the factors. Felce and Kerr (2013) carried out a secondary analysis of existing data ($N = 818$) and found ASD, level of adaptive behavior, and age to be influential risk markers for challenging behavior, whereas gender was not proven to be significant. In this study, 25% of the variance could be explained with the regression model.

In reviewing the literature, Koritsas and Iacono (2012a, 2012b) defined a difference between risk markers and causes. They described risk markers as context, gender, age, severity of ID, associated impairments, and residential settings. The literature, however, shows inconsistent results for each of these factors. Concerning the causes, Koritsas and Iacono (2012b) distinguished three theoretical approaches: applied behavior analysis (ABA), biological factors, and psychiatric disorders. The obvious complex nature of causes for challenging behavior led them to suggest a biopsychosocial model that can take a variety of causes into account.

An overview of the literature suggests two key questions that are addressed in the present study: What is the prevalence rate, and what are the main risk markers of challenging behavior among persons with ID? According to Koritsas and Iacono (2012a, 2012b), we do not understand risk markers as causal conditions and rather prefer an understanding as correlates. Therefore, we use the term *putative risk markers*.

Studies applying either the DBC or the CBCL report similar results regarding the prevalence of challenging behavior. In regard to the occurrence of challenging behavior there are well-established risk markers (e.g., level of ID, need for care, communication, gender, residential setting). This study evaluated these well-established correlates for challenging behavior and intellectual disability in order to replicate the results in a large and representative sample of students with ID.

2. Methods

2.1. Participants and enrollment

The current study was conducted in the German federal state of Bavaria. The sample is the same as described in Ratz and Lenhard (2013). With 12.5 million inhabitants, Bavaria is one of the largest regions in Germany and contains rural as well as urbanized and metropolitan areas such as Munich (Bundesamt für Bauwesen und Raumordnung, 2011). Bavaria is further subdivided into seven local districts, differing slightly in their school policies. Bavarian students with ID are offered

Table 1
Comparison of the Sample vs. the Basic ID Student Population.

	Sample (n = 1612 and 1596)		Basic ID Student Population (N = 11,075)[a]	
	n	%	n	%
Gender				
male	1004	62.3	6798	61.4
female	608	37.7	4277	38.6
Age				
6–10	548	34.3	3377	30.5
11–15	631	39.5	4632	41.8
≥16	417	26.1	3066	27.7

[a] Bayerisches Landesamt (2010).

Table 2
Sample Characteristics (N = 1629).

	n	%	Mean Age	SD
Gender (n = 1612)				
male	1004	62.3	12.8	3.8
female	608	37.7	13.4	3.8
Age (n = 1596)				
6–10	548	34.3	8.9	1.5
11–15	631	39.5	13.6	1.8
≥16	417	26.1	17.7	1.5
ID (n = 1593)				
no ID	16	1.0	11.3	4.5
mild ID	529	33.2	12.1	3.7
moderate ID	579	36.4	13.5	3.6
Severe ID	259	16.3	13.3	3.8
profound ID	210	13.2	13.9	3.9
Total	1612	100.0	13.0	3.8

ID = Intellectual Disability according to ICD–10.

five types of special education schools: schools for ID, schools for the physically disabled, schools for the blind, and, less often, schools for profound or severe ID and schools for rather mild ID but challenging behavior. In total, there were 11,075 students with ID in Bavaria attending 111 special education schools in 2010 (Bayerisches Landesamt, 2010).

At the time of the investigation (January 2010), the Bavarian school system in the field of special education was highly non-inclusive: Nearly all (97.8%) of the students with ID in Bavaria attended one of these special education schools. Inclusive settings, therefore, could not be involved in this sample. At present, these settings gradually are being set up in Bavaria, and these changes may be of interest in a follow-up study.

To draw a representative sample, the three layers of settlement structure, region, and school type were taken into account and combined as a stratified sample for complete schools (clusters). Twenty schools were chosen randomly, and teachers were asked to assess every student, thus aiming to complete a full assessment. In consideration of the return rate of 56% and disproportions among the layers, the sample then was weighted to be proportional to the basic ID-student population (Ratz & Dworschak, 2012). In total, 1629 questionnaires were included in the analysis, representing some 15% of all students with ID in Bavaria. The sample corresponds well with the basic ID-student population as reported by the official statistical authorities (Bayerisches Landesamt, 2010) (Table 1). The gender ratio is nearly identical, and the ages also correspond well between the sample and basic student population.

The characteristics of the sample are shown in Table 2. The age of the students was grouped according to German school stages, which are roughly similar to elementary, secondary, and high school (*Grundschulstufe, Hauptschulstufe*, and *Berufsschulstufe*, respectively). The quota of students in these age groups is not consistent as each stage has a different length: the youngest group 4 years (ages 6–10), the middle group 5 years (ages 11–15), and the eldest group usually only 3 years (ages 16–18, though sometimes up to 21 as some students are granted extra time in school).

Furthermore, according to the teachers, 1% of students had no ID. We assume that there were other reasons for their attendance at special education schools for ID such as ASD, extremely challenging behavior, or severe psychiatric problems or a problematic socioeconomic background. There was a tendency for students from socioeconomic disadvantaged families to have less severe ID (Spearman r = 0.134; p < 0.01).

School placement politics in Germany differs from international psychiatric standards such as the DSM–IV. According to Irblich and Stahl (2003), based on the *Diagnostic and Statistical Manual of Mental Disorders, 4th Edition* (DSM–IV; American Psychiatric Association, 1994), 85% of the individuals with ID have a mild ID, whereas in German schools for ID this group represents only 43%. It should be mentioned that there is a type of special education schools for students with learning disabilities in Germany. This special characteristic of school placement politics in Germany is rather unknown in other countries. These differences continue with regard to moderate ID (10% in DSM–IV vs. 26% in German schools), and yet again

with regard to severe and profound ID, which together represent 5% in the terms of the DSM–IV, but 31% in German schools for ID.

2.2. Measures and procedure

To attain information, questionnaires were designed, and teachers were given one questionnaire for each student. There are no empirical results referring to the reliability of teachers' answers that can be reported. Nevertheless, for various reasons data collection is only possible through the teachers, and both the DBC and the CBCL have the same procedure: Only few students with ID, especially not those with severe and profound ID, would be able to participate in standardized test routines. On the other hand, classes for students with ID are very small (6–10 students). This gives teachers the opportunity to get to know their students in a much more intensive manner, and they also tend to know the parents and home surroundings very well. Above all, each teacher holds a university diploma on the subject of ID and therefore is very familiar with all issues of the questionnaire (Ratz & Dworschak, 2012).

Each teacher filled out questionnaires for 13 students in the mean, ranging from 5 to 18. The questionnaire asked the teachers to categorize each student in many relevant educational aspects, such as behavior, diagnostic, socio-demographic information such as socioeconomic background, and intensity of ID. To analyze these data we applied methods similar to those used in other studies (Einfeld et al., 2011; Koritsas & Iacono, 2012a; McClintock et al., 2003).

Comparatively few instruments are available for assessing challenging behavior among students with ID (Sarimski & Steinhausen, 2007). The questionnaire applied is the German translation of the DBC (Einfeld & Tonge, 1995) called *Verhaltensfragebogen bei Entwicklungsstörungen* (VFE; Einfeld, Tonge, & Steinhausen, 2007). The DBC has a satisfactory inter-rater reliability (intraclass correlation = 0.60) (Einfeld et al., 2007). The internal consistency is high ($\alpha = 0.941$). Reliability and validity of the VFE are between satisfactory and good (Sarimski & Steinhausen, 2007).

The original DBC comprises 94 items, asking the teachers to estimate the occurrence of certain behavior in the past 2 months. Each item may be labeled with 0 (*not true as far as you know*), 1 (*somewhat or sometimes true*) or 2 points (*very true or often true*). A maximum of 188 points is possible. The Total Behavior Problem Score (called the GVPW in the German version) gives an overall measure of behavioral and emotional disturbance. To apply a limit for unproblematic behavior, a cutoff mark is given (30), meaning that scores of 31 and greater suggest distinct problems in behavior and emotion.

For the present study, 33 of the 96 items were selected. The selection considers only the highest rating items (>0.50) that are found in factor analyses of DBC and VFE (Einfeld et al., 2007). Hereby, a maximum of 66 points is possible. This scale was subject to an analysis of reliability showing a good consistency coefficient ($\alpha = 0.89$). The cutoff mark was adapted mathematically to 10.5, meaning that scores of 11 and greater distinct problems in behavior and emotion (Einfeld et al., 2007).

Additionally, the teachers were asked to rank the severity of ID of each student according to the *International Classification of Diseases and Related Health Problems, Revision 10* (ICD–10; World Health Organization, 1992). The need for care was assessed during the time of school lessons between 8 a.m. and 1 p.m. Teachers were asked to rate the time needed for care in the categories "no need for care," "0–30 min," "30–90 min," "90 min to 3 h," and "more than 3 h" (Wagner & Kannewischer, 2012a). Communication was assessed in a twofold manner: expressive speech competencies were "no phonetic language," "one-word sentences," "two-word sentences," "sentences with more words," and "sentences with main and sub-clauses." Receptive speech competencies included "not assessable," "understands words, small sentences and instructions," and "understands more complex sentences and instructions" (Wagner & Kannewischer, 2012b).

The students' migration background was assessed according to the official terms in Germany, meaning that at least one of the three aspects "no German citizenship," "not born in Germany," or "native tongue other than German" applies. SES was measured using the Family Affluence Scale (FAS), which was developed for the Health Behavior in School-Aged Children Study (HBSC) of the World Health Organization (Currie et al., 2008). The FAS originally was devised to be answered by students themselves and is based on the number of cars in the family, the number of family holidays in the last 12 months, whether or not children have their own room, and the number of computers in the family. The answers add up to a maximum of 7 points, and the score then is converted into an ordinal scale (low, middle, and high SES). In contrast to the original use of FAS, these questions were answered by the teachers, who used their knowledge of the child or asked students and parents. The final question referred to the residential setting of each student.

The questionnaire and the whole procedure were approved by the Bavarian federal ministry for school politics. The parents of each participating student confirmed their consent to the questionnaire.

2.3. Data analysis

The first step after analyzing the prevalence rates of challenging behavior among students with ID was to analyze the individual and environmental variables in group differences in a univariate manner (χ^2, U, t, F). Finally, we conducted a binary logistic analysis of regression to assess the importance of the combined putative risk markers, as well as of each individual putative risk marker, for the emergence of challenging behavior. For this purpose, we designed a regression model including the above-mentioned variables. To identify possible co-variables, which need to be excluded from the model, bivariate

Table 3
Prevalence Rates of Challenging Behavior Among Students with ID.

	n	Min	Max	M	SD	Subset α =0.05 (Duncan)			p
						I	II	III	
Gender									t(1426) =
male	879	0	49	13.8	9.7				4.959,
female	548	0	50	11.3	9.1				p < 0.001
Age									F(2, 1410) =
6–10	487	0	49	13.9	9.9		13.9		5.528,
11–15	566	0	45	12.2	9.1	12.2			p < 0.005
16–21	360	0	50	12.2	9.6	12.2			
ID									F(4, 1412) =
none	14	0	28	9.1	8.9	9.1			12.262,
mild	501	0	49	10.9	8.9	10.9	10.9		p < 0.001
moderate	529	0	50	13.1	9.4		13.1	13.1	
severe	221	0	49	15.8	10.5			15.8	
profound	153	0	42	14.0	9.0		14.0	14.0	
Total	1440	0	50	12.8	9.5				

ID = Intellectual Disability according to ICD–10.

correlation analyses (r_s) were calculated. The quality of the whole model was evaluated by means of Nagelkerke R^2. The strength of the single putative risk markers is shown by the logit-coefficient (Exp (B)).

3. Results

3.1. Prevalence of challenging behavior

The mean score of problems in behavior and emotions (GVPW) of students with ID was 12.8 (Table 3). This result displays a considerable variance (*SD* = 9.5); the lowest score accounts for 0, the highest for 50 points. The mean score for male students was 2.5 times higher than that for female students, representing a value 20% higher. Different mean values also were recognized in the age groups: 1.7 times higher among children age 6–10 (primary school) than those age 11–21 (secondary and high school). Post-hoc tests (Duncan) show that the difference between primary and secondary school age was significant but not between secondary and high school stage (Table 3).

The mean values also differed regarding the degree of ID, showing the highest figures for those with severe ID, followed by profound and moderate ID. The mean value was lowest among non-ID and mild ID. Post-hoc tests (Duncan) showed no significant differences among none and mild ID; mild, moderate, and profound ID; or moderate, severe, and profound ID (Table 3)

Applying the cutoff mark, 52.1% of the students appear to be above this mark. The 95% confidence interval was between 50.1% and 54.1%.

3.2. Putative risk markers of students with id for challenging behavior

Subsequently, the two groups of students with and without challenging behavior were analyzed further. Regarding the degree of ID, it became apparent that in the group of students with challenging behavior there were more students with a higher degree of ID (middle to profound) than in the group of students without challenging behavior (Table 4, Fig. 1). Likewise, this trend occurred when considering need for care. Students with challenging behavior had a greater need for care than those without (Fig. 2).

Differences between both groups also were evident with regard to communication. Students with ID and challenging behavior showed less speech competencies in both expressive and receptive language. The aspect of gender also was distinctly shifted, with the proportion of male students 13% higher in the group of students with challenging behavior. No significance between the groups could be attached to the factors of age, migration background, and SES.

Finally the data showed that students with ID and challenging behavior live in residential facilities more frequently (12.1%) as compared to children and teenagers with ID and without challenging behavior (7.3%).

We next investigated how important the individual factors were for the likelihood of challenging behavior. These so far have been analyzed only in a univariate manner. The putative risk markers for challenging behavior are described by means of a binary logistic analysis of regression. The model included challenging behavior (GVPW > 10.5) as the dependent variable. The explaining variables were based on the aspects described in the previous section (Table 5). The aspects of age, migration background and SES, however, were not taken into account, as they were not shown to be significant.

We designed a model including the variables degree of ID, need for care, expressive and receptive language competencies, gender, and residential setting in a non-categorical manner (Table 5). The model included 1316 students. The quality criteria of the model can be calculated by means of Nagelkerke R^2, which shows that 7.1% of the variance concerning challenging behavior can be explained. The Hosmer-Lemeshow-test was non-significant (*p* > 0.05), thus describing a good adaption of

Table 4

Putative Risk Markers of Students With or Without Challenging Behavior.

Risk Markers	Students With Challenging Behavior		Students Without Challenging Behavior		P
	n	%	n	%	
Degree of ID (n = 1418)					
no ID	4	0.5	10	1.5	U(4) = 212976.5,
mild ID	208	28.3	293	42.9	p < 0.001
moderate ID	293	40.0	235	34.5	
severe ID	140	19.1	81	11.9	
profound ID	89	12.1	64	9.2	
Need for Care (n = 1416)					
none	286	38.8	364	53.6	U(4) = 215973.5,
0–30 min.	190	25.7	156	23.0	p < 0.001
30–90 min.	134	18.2	76	11.2	
90 min–3 h	77	10.5	58	8.7	
>3 h	50	6.8	24	3.5	
Expressive Language (n = 1430)					
none	136	18.1	97	14.2	U(4) = 229816,
one-word sentences	72	9.6	49	7.2	p < 0.001
two-word-sentences	97	12.9	56	8.2	
sentences with more words	272	36.4	240	35.2	
sentences with main and sub-clauses	172	23.0	240	35.2	
Receptive Language (n = 1384)					
not assessable	57	7.9	50	7.6	U(2) = 524520.5,
understands words, small sentences and instructions	406	56.1	256	38.8	p < 0.001
understands more complex sentences and instructions	261	36.0	353	53.6	
Gender (n = 1427)					
male	505	67.8	374	54.8	χ²(1) = 25.2,
female	240	32.2	308	45.2	p < 0.001
Migration Background (n = 1254)					
without	527	81.5	498	82.1	χ²(1) = 0.07,
with	120	18.5	109	17.9	p > 0.05
SES (n = 788)					
low SES	167	40.9	160	42.4	U(2) = 79992,
middle SES	172	42.0	148	39.0	p > 0.05
High SES	70	17.1	71	18.7	
Residential Setting (n = 1419)					
family (including extended and foster families)	649	87.9	630	92.7	χ²(1) = 9 0.3,
residential facilities	90	12.1	50	7.3	p < 0.005
	M	SD	M	SD	p
Age (n = 1435)	12.8	3.8	13.2	3.7	t(1433) = 1.8, p > 0.05

ID = Intellectual Disability according to ICD–10.
SES = Socioeconomic Status.

Table 5

Model of Regression (n = 1316).

Putative Risk Markers	Regression coefficient B	s	p	Exp(B)	95% CI of Exp (B)
Degree of ID	0.110	0.091	0.229	1.116	0.933
Need for Care	0.171	0.068	0.012	1.187	1.038
Expressive Language	0.052	0.067	0.432	1.054	0.925
Receptive Language	−0.274	0.126	0.030	0.761	0.594
Gender	−0.567	0.117	0.000	0.567	0.451
Residential Setting in Institutions	0.522	0.199	0.009	1.686	1.141

the model. The model predicted 61.2% of all cases. Table 5 shows all putative risk markers, their regression coefficient b, and the logit-coefficient (Exp(B)).

Significance was observed regarding need for care, receptive language competencies, gender, and residential setting. Results showed that gender and receptive competencies increase the risk of developing challenging behavior similarly by the factors 0.6 and 0.7, respectively. The impact of need for care and residential setting is much higher, so the need for care increased the risk of developing challenging behavior by the factor of 1.2 and residential setting by 1.7. Gender, receptive language competencies, need for care, and residential settings seem to be significant putative risk markers for developing challenging behavior although the impact of need for care is two times higher than gender and receptive language competencies and the impact of residential setting is nearly three times higher than those factors.

In a last step, we modified the regression model, removing the putative risk markers in model 1 (Table 5) without significance and considering the remaining putative risk markers categorically. This was done to identify the relevant risk markers more accurately. The category of reference was fixed to the first figure in need for care and residential setting
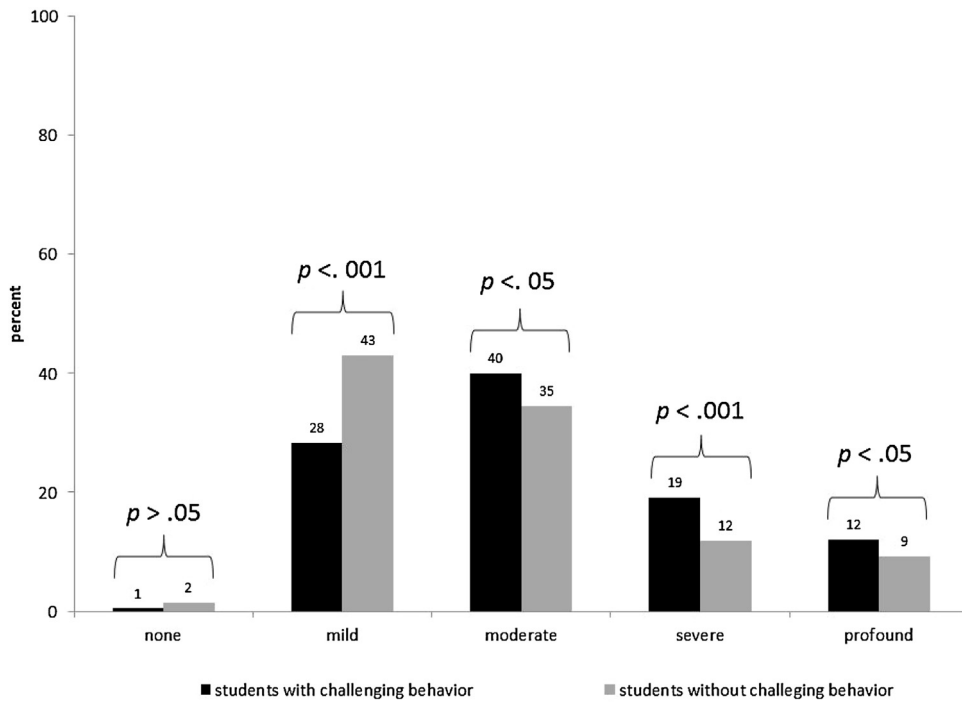
Fig. 1. Degree of ID of students with or without challenging behavior.
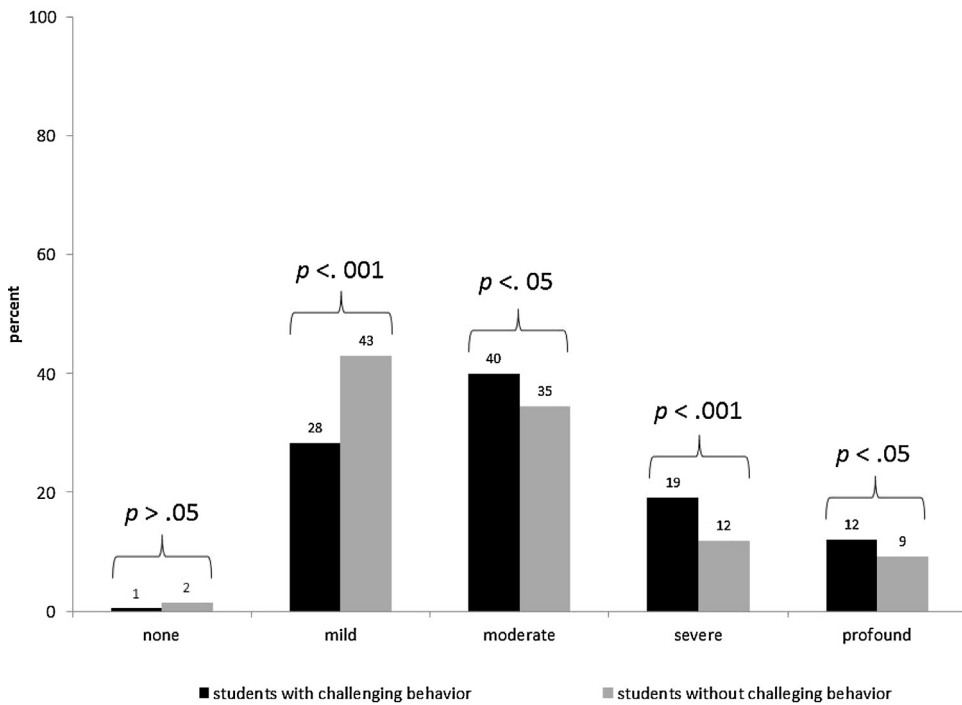

Fig. 2. Need for care of students with or without challenging behavior.

and the last figure in the receptive language competencies and gender (Table 6). The model included 1344 students. The model explained 8.4% of the variance concerning challenging behavior (Nagelkerke). Regarding the complexity of challenging behavior this seems satisfactory. Hosmer-Lemeshow-test is non-significant ($p > 0.05$). The model predicts 61.0% of all cases.

Table 6
Model of Regression (Categorical) (*n* = 1344).

Putative Risk Markers	Regression coefficient B	*s*	*p*	Exp(B)	95% CI of Exp(B)
Need for Care					
no need for care (category of reference)					
0 to 30 min.	0.254	0.143	0.076	1.289	0.974
30 to 90 min.	0.648	0.182	0.000	1.913	1.340
90 min to 3 Std.	0.435	0.231	0.059	1.545	0.983
>3 Std.	0.841	0.292	0.004	2.318	1.309
Receptive Language					
understands more complex sentences and instructions (category of reference)					
not assessable	−0.094	0.260	0.718	0.911	0.547
understands words, small sentences and instructions	0.549	0.124	0.000	1.731	1.356
Gender	0.523	0.117	0.000	1.688	1.343
Residential Setting in Institutions	0.509	0.196	0.009	1.664	1.134

Table 6 shows that for students with a need for care between 30 and 90 min during school time (8 a.m.–1 p.m.), the occurrence of challenging behavior is twice as high as for children without need for care. The occurrence among students with a need for care of more than 3 h increases by a factor of 2.3.

In regard to receptive language competencies, the model showed that for students who understand words, small sentences, and instructions, the risk for developing challenging behavior is nearly twice as high as for children who understand more complex sentences and instructions. Furthermore, the risk for boys increases by a factor of 1.7 compared to girls. The risk for students living in residential facilities likewise increases by a factor of 1.7 compared to those living in families (including extended and foster family settings).

In summary, the aspects need for care, receptive language competencies, gender, and confinement in residential facilities prove to be meaningful putative risk markers for challenging behavior among students with ID. Need for care seems to be the most important putative risk marker, followed by receptive language competencies, gender, and confinement in residential facilities.

4. Discussion

The present study examined prevalence rates and putative risk markers of challenging behavior among a representative sample of students with ID (*N* = 1629) in Bavaria, one of the largest regions in Germany. The study evaluated well-established correlates for challenging behavior and intellectual disability in a large, representative sample.

The referred prevalence rate of 52.1% (50.1%–54.1%) is broadly comparable to those found in similar studies, where prevalence rates of 30–50% were measured (Einfeld & Tonge, 1996). The different conditions of the various studies must be taken into account, however, when comparing the prevalence rates. When comparing the present rate to the results of Cormack et al. (2000), which were assessed with nearly the same instrument (DBC) but by parents instead of teachers, the result is almost identical (50.4% versus 52.1%). Other studies applying the DBC present lower prevalence rates, such as Einfeld and Tonge (1996) (40.7%), measured by parents and caregivers, and Molteno et al. (2001) with 31%, measured by teachers. Studies applying the CBCL, which is comparable in many aspects, present similar data: Dekker et al. (2002), 50%; Soltau et al. (2015), 52.4%; and Gosch (2004), 63%.

How comparable are these prevalence rates with the present results? As reported, the present study applies a short form of the German version of the DBC. Consequently, it cannot be ruled out that the divergent results of this short form and those from studies using the original DBC are due to methodological aspects (sample and questionnaire).

Most similar to the present research is the study conducted by Molteno et al. (2001). Both studies refer to students with ID attending special education schools. While Molteno et al. (2001) used data from 355 children and adolescents, the sample of the present study is meaningfully larger, including 1629 students. Furthermore, the Molteno et al. (2001) sample originates from two schools, whereas the present study refers to a representatively and randomized sample of a large region. The samples are comparable concerning level of ID, age, and gender. The prevalence rate being 10% lower cannot definitely be explained with the above-mentioned aspects of comparison.

The present study also revealed numerous putative risk markers or correlates for challenging behavior. It should be pointed out that the risk markers described are not necessarily causal conclusions for challenging behavior and could be the consequence of challenging behavior (Koritsas & Iacono, 2012a, 2012b). This applies especially for the aspects of need for care or residential setting. The relationship between both cannot be definitely settled.

It appears that challenging behavior is associated with more need for care, mean language competencies, gender, and residential setting. McClintock et al. (2003), Einfeld et al. (2011), and Koritsas and Iacono (2012a) also found gender to be an additional significant risk marker. However, this finding was not confirmed by Felce and Kerr (2013). The study by McClintock et al. (2003) confirms the aspect of communication as a risk marker and is unique in describing confinement in residential settings as a further significant risk marker for the development of challenging behavior.

The present study did not find an association of challenging behavior and level of ID, as described by McClintock et al. (2003) and Koritsas and Iacono (2012a), mainly due to the impossibility of isolating overlapping issues closely related to ID. The different findings probably can be explained through the different methods of measurement. In the present study, a teacher questionnaire was applied. Most teachers were able to use intelligence quotient (IQ) marks from school files, but these are imprecise due to different inventories being used, especially with regard to students with profound and severe ID.

In summary, there are ambiguous results toward risk markers; only migration background and socioeconomic background could not be confirmed as risk markers in any of the cited studies.

The regression model designed in this study explained 8.4% of the variance for challenging behavior. This represents a lower level than in the studies conducted by Gosch (2004) or Felce and Kerr (2013), which may be due to the different designs of the samples. Contrary to Gosch (2004), the sample in this study was not based on any specific syndromes, rather aiming to create a representative sample of all students with ID in a large region. The difference in variance between the present study and Felce and Kerr (2013) is smaller (17.3%) and might be associated with different indicators in the regression model.

The regression model used in the present study identified the need for care as the most relevant putative risk marker for challenging behavior. Poor communication, gender, and confinement in residential facilities also proved meaningful. These aspects also were found to be meaningful by McClintock et al. (2003), Gosch (2004), and Felce and Kerr (2013). The limited expressiveness allows several considerations. Further putative risk markers are imaginable that were not included into the regression model (e.g., ASD diagnosis, presence of genetic syndromes, health problems, attention deficit/hyperactivity disorder characteristics). On the other hand, it is possible that the development of challenging behavior is determined mainly by situations and interactions between individuals and environment.

The present study analyzed risk markers for challenging behavior as a single construct. During the transformation into a short form, the subscales were conserved for means of a balanced reduction of items but not in a way that allows statistical analysis. Thus, no further differentiation of the construct of challenging behavior could be achieved.

In summary, the given sample allows generalized statements to be made about students with ID in Bavaria, Germany. Clusters, the classes in the schools, as well as the return rate of 56% were weighted to gain appropriate data. No other aspects are known that could be responsible for any further bias.

5. Conclusion

This article analyzes prevalence and putative risk markers for challenging behavior among a representative sample of students with ID in Bavaria, Germany. It reveals that students with ID and challenging behavior can be distinguished from students with ID and without challenging behavior by specific factors. Moreover, meaningful putative risk markers for the occurrence of challenging behavior are named. The limited expressiveness of the model explaining 8.4% of variance shows that challenging behavior in this sample either is determined mainly by situations and interactions between individuals and environment or it is determined by risk markers that were not measured. This strengthens the proposal by Koritsas and Iacono (2012b) to apply a biopsychosocial model to explain causes of challenging behavior.

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