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Peer influence on problem behaviors among students with intellectual disabilities

Christoph M. Müller^{a,*}, Antonius H.N. Cillessen^b, Sara Egger^a, Verena Hofmann^a

^a Department of Special Education, University of Fribourg, Switzerland

^b Behavioural Science Institute, Radboud University, The Netherlands

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ABSTRACT

Background: Students with intellectual disabilities (ID) exhibit increased rates of problem behaviors compared to those without ID.

Aims: Given the evidence of peer influence in typical development, we examined the impact of classmates' characteristics on problem behaviors of students with ID. We expected higher levels of problem behaviors in special needs classrooms will influence individual development of such behaviors.

Methods: A longitudinal design with measurements at the beginning and the end of a school year was applied. Staff reported on problem behaviors of 1125 students with ID (69 % boys; age 11.30 years, $SD = 3.75$) attending 16 Swiss special needs schools.

Results: The peer influence hypothesis was not supported for an overall problem behavior score. However, exploratory analyses suggested that peer influence did occur for the domains anxiety, problems in relating socially, and communication disturbances (not disruptive/antisocial, self-absorbed and other types of problem behaviors). The influence of classmates on anxiety was lower when there was more variability in anxiety within the classroom. The development of communication skills benefitted from attending a classroom that was heterogeneous in the level of communication problems.

Conclusion: Our results suggest that the influence of peers on problem behaviors in special needs schools is not universal but varies between domains and depends on classroom characteristics.

What this study adds

Children and adolescents with intellectual disabilities (ID) exhibit increased rates of problem behaviors compared to those without ID. This is typically explained by both individual characteristics and contextual factors, such as in situ learning processes in the interaction with adults. A factor less considered is peer influence. Given that in typical development peers from the classroom have an important impact on behavioral difficulties we investigated in how far problem behavior levels of classmates in special needs schools affect the behavioral development of students with ID. We examined this question using a longitudinal research design and data on 1125 children and adolescents attending special needs schools for students with ID.

Our results suggest that classroom peer influence on problem behavior is not universal in ID. We did not find a classroom peer effect for the general level of problem behaviors. However, exploratory analyses suggest that lower levels of anxiety, problems in relating

* Corresponding author at: Department of Special Education, University of Fribourg, Petrus-Kanisius-Gasse 21, 1700, Freiburg, Switzerland.
E-mail address: christoph.mueller2@unifr.ch (C.M. Müller).

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socially, and communication disturbances among the classmates may contribute to an individual reduction of these problem behaviors among students with ID. Also, variability in problem behavior levels among classmates appears to influence individual behavioral development.

The new insights from this first study on classroom-level peer effects in ID contribute to a better understanding of behavioral difficulties in children and adolescents with ID. Nevertheless, many questions remain open with regards to peer socialization in this group of persons. We discuss future directions for such research and perspectives for supporting students with ID in their classroom peer context.

1. Introduction

Intellectual disability (ID) is typically defined by an individual's problems in intellectual functioning (i.e., $IQ < 70$) and adaptive behaviors (i.e., conceptual, social, and practical everyday-life skills) that are two standard deviations below the population mean, and an origin before the age of 22 years (American Association on Intellectual & Developmental Disabilities, 2021). ID is often associated with increased levels of problem behaviors (Dekker, Koot, van der Ende, & Verhulst, 2002). These types of behaviors, sometimes also referred to as challenging behaviors or emotional and behavioral disturbances, can be externalizing (e.g., verbal or physical aggression) or internalizing (e.g., anxiety, depression; Achenbach & Edelbrock, 1978). We conceptualized problem behaviors in students with ID following Einfeld and Tonge (1995). They regard an individual's behaviors and emotions as disordered when there is a qualitative or quantitative deviance that cannot be explained by developmental delay alone, that causes distress to the person or caregivers, and is a significant added impairment to adaptive functioning. Students with ID who exhibit high rates of problem behaviors over longer times are at risk for injury, controversial medication and restraint, social isolation, and often have to rely on residential service provision (see also, Emerson & Einfeld, 2011; Sherrard, Tonge, & Ozanne-Smith, 2002). Problem behaviors of students can be very challenging for parents, caretakers, and teachers and are a main cause of stress and burnout for them (Brunsting, Sreckovic, & Lane, 2014; Hastings & Brown, 2002). It is thus crucial to understand the factors that affect the development of problem behaviors in students with ID.

Several factors have been brought forward in the literature to explain the behavioral problems of students with ID. For example, problems in intellectual and adaptive functioning as well as specific genetic syndromes have been found to be associated with problem behaviors (e.g., Emerson & Einfeld, 2011; McClintock, Hall, & Oliver, 2003). Research also indicates that boys and younger students with ID typically exhibit higher rates of behavioral problems (De Ruiter, Dekker, Verhulst, & Koot, 2007; McClintock et al., 2003). Besides individual factors, the social environment plays a critical role. There is strong evidence that in situ learning processes, such as positive and negative reinforcement in interactions with adults, contribute to the development and maintenance of behavioral problems among students with ID (e.g., Emerson & Einfeld, 2011; Matson et al., 2011; Petscher, Ray, & Bailey, 2009). An environmental factor less considered in research on problem behaviors in ID is peer influence. This is surprising given the large number of studies among typically developing students indicating that the behavioral characteristics of the peers impact the development of individual behavioral problems through various social influence processes (for overviews, see Brechwald & Prinstein, 2011; Dishion & Tipsord, 2011). In light of this evidence, the aim of the current study was to investigate the role of peers in the development of problem behaviors among students with ID.

An important peer group for students with ID is formed by their classmates. As many students with ID attend special needs schools, we hereby focus on the peers in this school type. The ratio of students with ID in special needs schools versus other school types is difficult to compare internationally because of variation in the conceptualization of ID and the organization and structure of school systems. With this in mind, reports suggest that in the US 5.5 % of all students with ID and 17.7 % of those with multiple disabilities attend separate schools, and 48.6 % of those with ID attend regular classrooms less than 40 % of the day (U.S. Department of Education, 2019). In some European countries the percentages of students with ID who attend special needs schools are even higher, for example in Germany (86.6 %, Kultusministerkonferenz, 2020) or the Netherlands (80–99 %, Smits & Schoonheim, 2016).

Investigating the influence of the classroom peer context in special needs schools on the behavioral problems of students with ID can contribute to a better understanding of these students' social development. In addition, it may inform how to best compose classrooms (e.g., in terms of levels and heterogeneity of problem behaviors among students) to foster positive peer influence processes.

1.1. Classmates' influence on problem behaviors

A large number of developmental studies has shown that social development, and problem behaviors in particular, are influenced by the characteristics of the peer group (Dishion & Tipsord, 2011). The proposed underlying mechanisms include, for example, conformity to peer group norms, social modeling, and peer reinforcement (for an overview, see e.g., Brechwald & Prinstein, 2011). The latter can be observed in reciprocal reinforcement during norm-breaking talk (so-called "deviancy training"; Dishion & Tipsord, 2011) but also in co-rumination, a communicative process especially among friends and among girls (Rose & Rudolph, 2006). Co-rumination includes the excessive, repetitive, and often speculative discussion of personal problems, which elicits positive verbal and non-verbal reinforcement by peers (e.g., attention). Another peer influence mechanism is emotional contagion or "the tendency to automatically mimic and synchronize facial expressions, vocalizations, postures, and movements with those of another person and, consequently, to converge emotionally" (Hatfield, Cacioppo, & Rapson, 1992, p. 153–154). Emotional contagion can explain observations of group members "catching" feelings of anxiety from each other (Kelly & Barsade, 2001) and appears partly based on the activation of the mirror neuron system (Hatfield et al., 1992).

Across different age groups, studies have shown that higher mean levels of problem behaviors among classmates increase the risk of

individual problem behavior over time, controlling for students' earlier individual problem behavior (for an overview, see Müller & Zurbriggen, 2016). Peer influence has been reported for various externalizing behaviors, including aggression (Espelage, Holt, & Henkel, 2003), oppositional and disruptive behaviors (Müller, Hofmann, Begert, & Cillessen, 2018; Powers, Bierman, & The Conduct Problems Prevention Research Group, 2013), self-control and risk-taking (Gardner & Steinberg, 2005; Meldrum & Hay, 2012), and delinquency (Araos, Cea, Fernández, & Valenzuela, 2014). On the internalizing side, the impact of peers has been demonstrated for the development of depressive and anxious behaviors among youth (Prinstein, 2007; Stevens & Prinstein, 2005).

Interestingly, classroom peer effects have been shown to be moderated by the heterogeneity of problem behaviors in classrooms. For example, Müller, Hofmann, Fleischli, and Studer (2016) found that peer influence on delinquency was greater when there was less variability in delinquency levels in the classroom. This effect may be explained by higher group pressure in more homogeneous groups (see also Rule, 1964). Furthermore, for students in heterogeneous classrooms there are models with different behavioral characteristics available which may contribute to more varied individual outcomes of peer influence.

1.2. The influence of classmates on students with ID

Less is known about the influence of classmates on problem behaviors of students with ID. Generally, individuals with ID are susceptible to social influence, as evidenced by the effects of social rewards on their behavior (e.g., Lloyd & Kennedy, 2014; Mace & Lalli, 1991; Oliver, Hall, & Murphy, 2005; Richman & Lindauer, 2002). Research on outer-directedness also suggests that persons with ID often rely on external cues from others to guide their behavior (Bybee & Zigler, 1998) and they are relatively easily influenced in judicial interrogations (Henry & Gudjonsson, 2003; Klemfuss & Olaguez, 2018). Some studies investigated the specific influence of peers. Strichart (1974) found that adolescents with ID imitated peers without ID and that the amount of imitation depended on the perceived competence levels of the involved partners. Egger, Nicolay, Huber, and Müller (2021) also observed peer influence: They conducted an experiment in which participants rated the "coolness" of persons presented on a photograph. Adolescents with ID changed their ratings more in the direction of peers' judgments than typically developing adolescents without ID. In a sample of 1354 juvenile offenders, Steinberg and Monahan (2007) found that adolescents with a lower IQ were generally less resistant to peer influence than those with a higher IQ (see also, Dekkers et al., 2017). While peer influence susceptibility can be expected to also depend on intellectual and social-emotional functioning, a few studies involving individuals with more profound ID observed changes in behavior (e.g., laughter), motor responses (e.g., holding of head), and heart rates during the presence or social interaction with peers (Brady, Martin, Williams, & Burta, 1991; Logan et al., 1998; Nijs & Maes, 2014; Scherler & Müller, 2018).

Few studies have investigated peer influence and ID with a focus on problem behaviors. In a sample of 102 adolescents with ID and 526 adolescents without ID, Asscher, van der Put, and Stams (2012) found no significant differences in self-reported resistance to antisocial peer influence between the two groups. Using an experimental task in which a virtual balloon had to be pumped up until it bursts, Bexkens et al. (2018) assessed risk-taking in peer conditions among boys with ID and control groups. They found that boys with mild to borderline ID increased their risk-taking under peer pressure compared to a solo condition. Other findings showed that risk-taking of boys with mild to borderline ID was higher under peers' negative risk encouragement (i.e., "You are a softy if you do not continue") than the risk-taking of typically developing boys (Wagemaker et al., 2020). Finally, some evidence for positive peer influence on problem behaviors came from a study showing that individuals with ID benefited from participating in a peer tutoring program to reduce challenging behaviors (Chesley, 1989).

In conclusion, there is evidence that individuals with ID are generally susceptible to social influence. However, in terms of peer influence on problem behaviors, there are very few studies that, taken together, do not yet allow clear conclusions on this issue. It is especially noteworthy that, to our knowledge, no study has investigated peer influence and ID on problem behaviors across a longer time period and in a naturalistic setting, such as school. In addition, it is an open question which role factors known to be associated with the severity of problem behaviors and peer influence, such as sex, age, adaptive behavior levels, and classroom heterogeneity, play in these processes (De Ruiter et al., 2007; McClintock et al., 2003; Müller et al., 2016).

1.3. The current study

The goal of the present study was to investigate the influence of classmates on problem behaviors in students with ID in special needs schools. The specialized all-day settings investigated here were attended by students with ID who were instructed in small classrooms. Hence, students were surrounded by classmates with ID across the whole day so that peer influence processes may be expected. We used a research design with two measurement points across a school year. Following the typical procedure to determine peer influence among classmates, we hypothesized that higher classroom levels of problem behaviors at T1 significantly predicted higher individual problem behavior levels at T2, controlling for individual problem behaviors at T1, sex, age, and classroom heterogeneity in terms of problem behavior (e.g., Kindermann & Gest, 2009). In addition, we controlled for students' individual adaptive behavior due to the evidence that a substantial part of problem behavior in ID can be explained by students' general level of functioning (e.g., Emerson & Einfeld, 2011; McClintock et al., 2003; Nicholls, Hastings, & Grindle, 2020).

As there is less research on the subject involving students with ID, it is difficult to deduct behavior domain-specific expectations. We therefore tested our hypothesis for an overall measure of problem behaviors typically seen in students with ID (Einfeld & Tonge, 1995). However, it must be noted that research with typically developing students shows variation in peer influence across different types of problem behaviors and depending on student characteristics (Brechwald & Prinstein, 2011). Furthermore, problem behaviors among students with ID include behaviors less seen in typical development (e.g., self-absorbed, autistic-like behaviors; Einfeld & Tonge, 1995). Both for the optimal interpretation of our results and to deduct perspectives for future research, we considered it important to

supplement the test of our main hypothesis for a composite measure of behavior problem with exploratory analyses of classroom peer effects for behavior problem subdomains. In addition, we tested the interactions of classmates' levels of problem behaviors with sex, age, adaptive behavior, and classroom heterogeneity.

2. Methods

2.1. Participants

Data were assessed in special needs schools for students with ID in Switzerland and we used a longitudinal research design with measurements at T1 (September–October 2018) and T2 (April–June 2019). Special needs schools for students with ID in Switzerland can only be attended by children and adolescents with a clinical diagnosis of ID (in practice rare exceptions may be possible). Following ICD-10, ID diagnosis in Switzerland is typically established using an IQ-test ($IQ < 70$) and a clinical rating of adaptive behavior. We contacted 20 school headmasters from whom 16 decided to participate in the study with their school (detailed procedures see below). The regional location of participating schools was 68.75 % urban (residents in Switzerland living in such regions: 62 %), 12.5 % peri-urban (Switzerland: 22 %) and 18.75 % rural (Switzerland: 15 %; Bundesamt für Statistik, 2017). The average size of schools was 80.05 students ($SD = 23.64$, range = 28–121) and classrooms were attended by 6.64 students on average ($SD = 1.72$, range = 4–15). Students had a mean age of 11.30 years ($SD = 3.75$, range = 4.17–19.08) and 69.0 % were boys. Overall, 379 members from the school staff reported on the students (T1: 75.4 % women; $M_{age} = 46.77$ years, $SD = 11.09$, range = 17–66). From these, 61.5 % had a special needs teacher diploma; others were regular teachers instructing specific school subjects, therapists, social workers, or long-time trainees. Each staff member reported on 2.95 students on average ($SD = 1.71$, range = 1–8) with whom they worked at school. The student sample included 1125 children and adolescents (of 1177 students in total) from 179 classrooms (of 182 classrooms in total) from the 16 participating schools, who participated either at T1 or T2 or at both measurement occasions. We therefore could use information on 95.58 % of all students attending the schools. Information on the other students was not available due to the decision by parents or staff not to participate in the study. From the 1096 students for whom a questionnaire was completed at T1, 1039 also participated at T2. The 57 students who dropped out did not differ significantly from the other students in age, sex, problem behaviors, or adaptive behavior levels.

2.2. Measures

2.2.1. Demographics

Teachers reported students' sex and their age in months.

2.2.2. Individual problem behaviors

To assess problem behaviors at T1 and T2 we used the German version of the Developmental Behavior Checklist-Teachers (DBC-T; Einfeld & Tonge, 2002; Einfeld, Tonge, & Steinhausen, 2007). In this instrument, staff report on a broad spectrum of problem behaviors typically seen in individuals with developmental disabilities (96 items, see Table 1). Staff rate how well each item describes the behavior of the individual being assessed (e.g., “bangs head”; 0 = not true, 1 = somewhat true or sometimes true, 2 = very true or often true). School staff members were asked to refer to students' behavior during the last two months. The overall scale includes six subscales for disruptive/antisocial behaviors, self-absorbed behaviors, communication disturbance, anxiety, relating socially, and a rest category for other problems (see Table 1). The German instrument is based on the English version of the DBC-T (Einfeld & Tonge, 2002) which was extensively evaluated and proved adequate validity and reliability (Gray, Tonge, Einfeld, Gruber, & Klein, 2018). The German version was evaluated by Steinhausen and Winkler Metzke (2005) showing the same factor structure as the English version and an internal consistency of $\alpha = .93$ for the overall scale and $\alpha = .58$ –.90 for the subscales (in the present data $\alpha = .67$ –.92). The norms of the instrument refer to an Australian sample of 640 4-to-18-year-olds with ID ($IQ < 50$). The clinical cutoff determining a level of problem behaviors in the psychiatric range ($PR > 60$) was determined based on receiver-operating-characteristics-analyses (for

Table 1

Overview of the Subscales of the DBC-T (Einfeld & Tonge, 2002; Einfeld et al., 2007).

	Number of items	Exemplary items
Disruptive/antisocial behaviors	27	Is impulsive, reacts before thinking; Kicks or hits others; Steals
Self-absorbed behaviors	31	Chews or mouths objects or body parts; Stares at lights or spinning objects
Communication disturbance	13	Repeats back what others say like an echo; Stands too close to others
Anxiety	8	Cries easily for no reason or over small things; Fears particular things or situations (e.g., the dark, insects); Is tense, anxious, or worried
Relating socially	9	Appears depressed, down, or unhappy; Moves slowly, underactive, does little (e.g., only sits and watches others); Is distant, in his or her own world
Other problems	10	Covers ears or is distressed when hears particular sounds; Sees or hears something that isn't there. Has hallucinations

details, see [Einfeld et al., 2007](#)). For the current analyses raw data of the DBC-T were used with higher values indicating more severe problem behaviors.

2.2.3. Classroom-level problem behaviors

Following other studies on peer influence in classrooms (e.g., [Araos et al., 2014](#)), the level of problem behaviors at the classroom level was calculated as the mean of all students' DBC-T-scores per classroom at T1.

2.2.4. Classroom-level heterogeneity

For each classroom at T1, the within-classroom variance of students' problem behavior levels measured with the DBC-T was calculated as an indicator of classroom-level heterogeneity.

2.2.5. Adaptive behaviors

Individual levels of adaptive behavior at T1 were estimated using a German translation of the Adaptive Behavior Assessment System-3 for teachers (ABAS-3; [Bienstein, Döpfner, & Sinzig, 2017](#)). The German questionnaire is based on the US-version of the ABAS-3 ([Harrison & Oakland, 2015](#)) which is an established instrument used in the assessment of ID. The questionnaire includes 174 items with descriptions of adaptive competences, which are rated 0 (*is not able to do this behavior*) to 3 (*always/or almost always*). Subscales include the domains of conceptual (Communication, Functional academics, Self-direction), social (Leisure, Social), and practical (Self-care, Health and safety, School living, Community use) competences. The subscale scores are summed to an overall score. Norms for the ABAS-3 have been established based on a representative US sample of 1896 persons from the general population. The ABAS-3 has demonstrated adequate validity and reliability (e.g., interrater reliability $r = .72-.81$; $\alpha = .86-.99$; [Harrison & Oakland, 2015](#)). In the current analyses we used the percentile rank of the overall score of adaptive behaviors (in the present data $\alpha = .95$) indicating adaptive competence relative to age. Higher values mean greater competence.

2.3. Procedure

The present study underwent a scientific and ethics review by the Institutional Research Commission of the Department of Special Education of the University of Fribourg and was approved before the study started. Recruitment of participating schools was based on written information about the study and personal meetings with school headmasters. A specificity of this study was that all assessments within schools were completely anonymous. Participants' names were never provided so that there was no possibility for researchers to ever identify individual students, parents, or staff members. In the data analyses, anonymous codes were used consisting of a school number, classroom number, and questionnaire number. Only the staff members who completed the questionnaires had a list of student names and corresponding questionnaire numbers. This list was stored in a safe place within the school, where the research team did not have access.

Before the assessment parents received a letter informing them about the study and the anonymity guaranteed for them and their child. Furthermore, it was emphasized that no medical diagnoses of students would be assessed. Parents were informed that participation was voluntary and that they could inform their child's teacher if they would not like to participate (in this case staff did not fill out questionnaires on this student). The letter was provided in a simple language version in the nine most frequently used languages in Switzerland. School staff was also informed about the study and could decide not to participate. For assessments, paper-pencil questionnaires for each participating student were distributed to staff members at a meeting at school. Questionnaires were filled out during this meeting and/or privately (per student about 30 min were required). Staff members received no personal rewards besides detailed feedback on the study results later on.

2.4. Statistical analyses

Preliminary analyses consisted of descriptive statistics of the average problem behaviors overall and by domain as well as changes from the beginning (T1) to the end (T2) of the school year. Correlations between all study variables were computed as well.

The main analyses consisted of multilevel longitudinal analyses in Mplus Version 8 ([Muthén & Muthén, 2017](#)). We first predicted individual problem behaviors (overall scale) at T2 from classroom-level problem behaviors at T1, controlling for individual problem behaviors at T1 ([Kindermann & Gest, 2009](#)). In order to test our hypothesis, we then added students' sex, age, and adaptive behavior as well as the heterogeneity of problem behaviors in the classroom to the model. Since our data were nested (students within classrooms) and we used classroom-level variables in addition to individual variables, all analyses were performed within a two-level framework with students at Level 1 and classrooms at Level 2 ([Raudenbush & Bryk, 2002](#)). Additionally, exploratory analyses were conducted for the different behavioral domains and the interactions between classroom-level problem behaviors and control variables were tested.

3. Results

3.1. Preliminary analyses

Mean percentile ranks of problem behaviors were 58.68 ($SD = 24.44$; range = 0–100) at T1 and 58.24 ($SD = 26.71$, range = 0–100) at T2 which is above the scores of the Australian test reference group of individuals with ID (i.e., mean percentile rank of 50). Based on the percentile ranks, about half of the students exhibited problem behaviors above the clinical cutoff score of the DBC-T (overall scale:

T1: 51.6 %; T2: 49.7 %), indicating generally high levels of problem behaviors in the sample. For the main analyses, raw mean scores for problem behaviors were used instead of percentile ranks. Fig. 1 shows the changes in raw scores of problem behaviors from the beginning to the end of the school year. For example, the mean overall score was 0.38 at T1 and 0.37 at T2, on a scale from 0 (least problems) to 2 (most problems). Hence, even though a major part of the sample exhibited clinically relevant amounts of problem behavior, the mean values were rather low compared to the Likert scale range. T-tests indicated a significant decrease of problem behaviors in the domains anxiety ($p < .01$) and relating socially ($p < .05$). Regarding the control variable adaptive behavior, percentile ranks were used in the hypotheses tests. The mean percentile rank of adaptive behaviors was 7.94 ($SD = 11.46$, range = 0–91) indicating a low level of adaptive competence (Harrison & Oakland, 2015). According to the criteria of the ABAS-3, 47.2 % had extremely low, 20.5 % low, 22.8 % below average and 9.5 % at least average adaptive competences.

Table 2 shows the correlations between the key variables used in the hypothesis test. More problem behaviors overall at the beginning of the school year were associated with more problem behaviors at T2. More individual problem behaviors were also associated with higher classroom-levels of problem behaviors and higher classroom heterogeneity at the same measurement occasion and over time. Problem behaviors were higher for students with lower levels of adaptive behaviors, younger students, and boys compared to girls.

3.2. Main analyses

Results depicted in Table 3 (Model 1) indicate that there was a significant effect of T1 classroom-level problem behaviors (overall scale) on later individual-level problem behavior, controlling for T1 individual behavior. Hence, there was a classroom-level effect over and above what could be explained by individual behavior at baseline. The standardized coefficient revealed a medium effect size (Cohen, 1988) for the peer influence effect ($\beta = .372$). However, when adding control variables (classroom heterogeneity of problem behaviors, students' individual sex, age, and adaptive behaviors), the effect of classroom-level problem behaviors was no longer significant (Table 3, Model 2). We therefore rejected our hypothesis regarding the effect of overall classroom-level problem behavior on future individual overall problem behavior.

3.3. Exploratory analyses

Models 1–6 in Table 4 refer to the exploratory analyses of classroom-level effects on individual behavior regarding the different domains of problem behaviors. As can be seen, there were significant effects of classroom-level behavior for communication disturbances, anxiety, and problems relating socially (controlling for T1 individual behavior in the respective domain and all control variables). Standardized coefficients indicated medium to large effect sizes for classroom-level problem behavior (communication disturbances: $\beta = .389$; anxiety: $\beta = .443$; problems relating socially: $\beta = .639$). That is, the more such problems occurred at the classroom-level at T1, the more problems individual students developed from T1 to T2. The effects of the other classroom-level behaviors (i.e., disruptive/antisocial, self-absorbed, and other behaviors) were not significant.

In addition, there was a significant negative main effect of classroom heterogeneity for communication disturbances. This effect indicated that the more students differed from each other in the level of communication disturbances in a classroom, the less individual

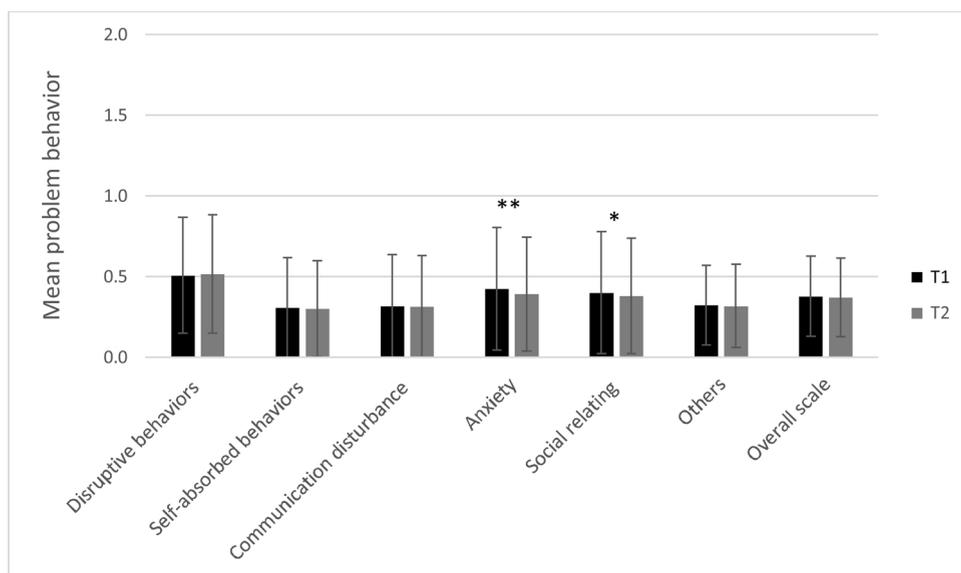


Fig. 1. Individual problem behaviors (mean raw scores and standard deviation per scale) at T1 and T2.

Notes. * $p < .05$; ** $p < .01$.

Table 2
Correlations between Main Study Variables.

	2.	3.	4.	5.	6.	7.
1. T1 Individual problem behaviors	.78**	.62**	.28**	-.40**	-.17**	.12**
2. T2 Individual problem behaviors		.53**	.23**	-.33**	-.17**	.13**
3. T1 Classroom-level problem behaviors			.44**	-.25**	-.29**	.09**
4. T1 Classroom-level variance of problem beh.				-.08*	-.13**	.07*
5. T1 Individual adaptive behaviors					.11**	-.06
6. T1 Age						-.04
7. Male						

Notes. * $p < .05$; ** $p < .01$.
901 < n < 1103.

Table 3
Results from Main Analyses Predicting Individual Problem Behaviors at T2 from T1 Classroom-Level Overall Problem Behavior.

	Model 1 B (SE)	Model 2 B (SE)
Class overall problem behavior mean	0.126 (0.058)*	0.120 (0.071)
Class overall problem behavior heterogeneity		-0.087 (0.186)
Individual T1 problem behavior	0.710 (0.029)**	0.701 (0.033)**
Male		0.020 (0.011)
Age		-0.001 (0.002)
Adaptive behaviors		-0.001 (0.000)*
Variance Level 1	0.021 (0.001)**	0.021 (0.002)**
Variance Level 2	0.002 (0.001)**	0.003 (0.001)**

* $p < .05$; ** $p < .01$.

Table 4
Results from Exploratory Analyses Predicting Individual Problem Behaviors in Each Domain at T2 from T1 Classroom-Level Problem Behavior in the Respective Domain.

	Model 1 ^a B (SE)	Model 2 ^a B (SE)	Model 3 ^a B (SE)	Model 4 ^a B (SE)	Model 5 ^a B (SE)	Model 6 ^a B (SE)
Class disruptive mean	-0.108 (0.074)					
Class disruptive heterogeneity	0.286 (0.147)					
Class self-absorbed mean		-0.032 (0.083)				
Class self-absorbed heterogeneity		0.076 (0.130)				
Class communication disturbances mean			0.175* (0.087)			
Class communication disturbances heterogeneity			-0.386 (0.143)**			
Class anxiety mean				0.172 (0.074)*		
Class anxiety heterogeneity				0.083 (0.129)		
Class social relating mean					0.155 (0.066)*	
Class social relating heterogeneity					-0.102 (0.113)	
Class other problems mean						0.047 (0.083)
Class other problems heterogeneity						0.374 (0.249)
Individual T1 problem behavior ^b	0.787 (0.026)**	0.780 (0.031)**	0.678 (0.036)**	0.513 (0.038)**	0.621 (0.030)**	0.635 (0.039)**
Male	0.031 (0.018)	0.012 (0.010)	0.038 (0.016)*	0.026 (0.018)	0.001 (0.018)	0.030 (0.013)*
Age	-0.004 (0.003)	0.004 (0.003)	0.000 (0.003)	-0.003 (0.003)	0.002 (0.002)	-0.004 (0.002)
Adaptive behaviors	0.001 (0.001)	-0.002 (0.000)**	-0.002 (0.001)**	-0.002 (0.001)*	-0.001 (0.001)	-0.002 (0.000)**
Variance Level 1	0.050 (0.003)**	0.023 (0.002)**	0.040 (0.003)**	0.068 (0.005)**	0.063 (0.004)**	0.031 (0.002)**
Variance Level 2	0.003 (0.001)**	0.003 (0.001)**	0.006 (0.002)**	0.006 (0.003)*	0.002 (0.002)	0.003 (0.001)*

^a Dependent variables on the individual level at T2: *Model 1*: Disruptive behavior; *Model 2*: Self-absorbed behavior; *Model 3*: Communication disturbances; *Model 4*: Anxiety; *Model 5*: Social relating; *Model 6*: Other problems.

^b Same behavioral domain as on classroom-level.

* $p < .05$.

** $p < .01$.

communication disturbances increased from T1 to T2 (medium effect size; $\beta = -.361$). There was no main effect of classroom heterogeneity for the other behavioral domains.

As classroom heterogeneity might also moderate the effect of classroom-level problem behavior, we further tested the interaction between classroom-level behavior and heterogeneity for the overall scale and each behavioral domain (not presented in Table 4). We found a significant interaction effect for anxiety ($B = -1.192$, $SE = 0.540$, $p = .027$, $\beta = -.892$), indicating that the effect of classroom anxiety on an increase in individual anxiety from T1 to T2 was reduced when there was more variability in anxiety in the classroom initially. More classroom heterogeneity thus diminished the classroom peer effect. No other moderating effects of individual-level variables such as sex, age, and adaptive behaviors were found, showing that peer influence did not depend on these individual characteristics.

It should be noted that throughout our exploratory analyses no corrections for multiple comparisons have been made given that we did not use them to test an overall hypothesis. Our main goal here was to identify tendencies that provide directions for more in-depth studies on peer influence on specific behavioral domains in the future.

4. Discussion

The goal of this study was to shed light on classroom peer influence on the development of individual problem behaviors among students with ID in special needs schools. Because little is known about peer influence on specific types of behavioral problems among students with ID, we tested our general expectation for an *overall* problem behavior index. The hypothesis of a classroom peer influence effect had to be rejected: The peer effect was no more significant when controlling for individual student characteristics and classroom heterogeneity. The substantial influence of earlier problem behavior and adaptive competence (in line with cross-sectional associations seen in Nicholls et al., 2020) and the lack of a peer effect under this condition suggests that individual characteristics of students with ID were more strongly associated with the overall behavioral development than the classroom peer context characteristics. Several reasons for this finding can be seen.

It is generally plausible that proximal, individual factors can have larger effects on problem behavior development than more distal, contextual factors. This may be especially the case for students with ID, who often have various cognitive and adaptive difficulties that can directly contribute to their problem behaviors (e.g., Emerson & Einfeld, 2011). Also, individual problem behaviors in ID are rather persistent with moderate to high stability levels in children (Totsika & Hastings, 2009). After controlling for a broad range of individual adaptive competences and earlier problem behavior, the peer context effect apparently was not substantial enough to remain meaningful.

However, another important aspect is that problem behavior as measured in the instrument used represents an overall estimate of a very heterogeneous set of behavior subtypes seen in students with ID. Studies on typically developing students show that peer influence differs across behavioral domains and for each susceptibility can depend on specific individual characteristics (e.g., Brechwald & Prinstein, 2011). Such differences may also be apparent in the even broader spectrum of behavioral problems seen in students with ID. It could thus be that analyses using an overall problem behavior index are not sensitive enough to detect peer influence that occurs in some, but not all domains. It is thus important to interpret our results not only in terms of the hypothesis test, but to also consider the tendencies found for specific subtypes of behaviors in the exploratory analyses. Although cautious interpretation is warranted, these preliminary findings may help to provide a more complete picture of the role of classmates in problem behavior development and can be used to identify directions for future research.

Our exploratory analyses indicated classroom peer effects for anxiety, problems in relating socially, and communication disturbances. The higher the level of anxiety in class, the more individual students increased in anxiety (or decreased less), taking all control variables into account. The same applies in the opposite direction: less anxiety among classmates was associated with a larger individual decrease (or less increase) of anxiety. These results are in line with studies on the impact of peers on internalizing behaviors in adolescents without ID (e.g., Prinstein, 2007; Stevens & Prinstein, 2005). As the present data did not make it possible to analyze the mechanisms underlying this effect, possible explanations have to rely on general knowledge on peer influence processes. Part of the peer effect on anxiety may be due to co-rumination among students and is possibly promoted by the small classroom size in special needs schools. However, many students with ID exhibit verbal difficulties (e.g., Memisevic & Hadzic, 2013) so that another process at play may be emotional contagion. ID is often associated with problems in self-control and emotion regulation (e.g., Jahromi, Gulsrud, & Kasari, 2008; Wilson, 1999) and students with ID may therefore be prone to emotional contagion when faced with expressive forms of anxiety (e.g., loud crying, strict avoidance of objects, etc.) by classmates. Support for this explanation may be seen in the finding that peer influence was stronger in classrooms with more homogeneous levels of anxiety, because more homogeneity and related closeness could facilitate emotional synchronization between peers (see also, van der Schalk et al., 2011). An alternative explanation is that students in more homogeneous classrooms perceive clearer behavioral norms and therefore experience more group pressure (Brechwald & Prinstein, 2011; Rule, 1964).

Similar processes may partly explain our preliminary results on peer influence on difficulties relating socially, a problem that also has emotional aspects. However, peer effects on both relating socially and communication disturbances may also be explained by the fact that both relate to social interactions between peers. For social interaction, students with ID in special needs schools strongly depend on opportunities in their peer context. For example, when a student experiences that most classmates withdraw from others, there are fewer opportunities for this student to interact with peers which in turn could contribute to withdrawal of this student over time as well. Another underlying mechanism could be social modeling, given that imitation in special needs classrooms relies on a small number of peer models. One can imagine that when, say, two students in a classroom of six stand too close to others when talking to them (item from DBC-T), there is a substantial chance that the other four students also try this behavior or even consider it to be

normative.

Besides the interaction between classroom heterogeneity and peer influence on anxiety, our exploratory analyses suggest that more within-classroom heterogeneity of communicative disturbances is related to an individual decrease of such disturbances. This finding may be due to the fact that in more heterogeneous classrooms peers with various levels of communicative abilities are available as interaction partners. Students are therefore required to adapt their communicative behavior to peers with different levels of verbal and non-verbal problems which may benefit their own communicative development.

No peer effects were found for disruptive/antisocial, self-absorbed and the category of “other” problem behaviors. Finding no evidence for peer influence on disruptive and/or antisocial behavior is not easy to interpret given that in typically developing students such effects have been observed (e.g., Müller et al., 2018; Powers et al., 2013). One line of explanation could be that in students with ID, who often show much higher levels of such problem behaviors than those without ID, these difficulties are also related to severe cognitive and neuropsychological issues that are at least partly biologically caused (e.g., Dykens, 2000). Disruptive behaviors may therefore be less affected by the peer context in students with ID because they are less able to control these behaviors than typically developing students. Similar explanations can be considered for self-absorbed and “other” behaviors which in the instrument used include many autistic-like and rather exceptional forms of behaviors. While there is some evidence for imitation of peers’ autistic behaviors among students with Autism Spectrum Disorder and ID (Nenniger & Müller, 2020), such behaviors may be less subject to peer influence than those involving more social interaction with others. However, as pointed out above, all of the results from our explorative analyses should be interpreted as preliminary and require replication and more in-depth analysis in future studies.

4.1. Implications

This study has implications for research and practice. Classroom peer effects have often been replicated for typically developing students (Müller & Zurbriggen, 2016) and the classroom peer ecology is increasingly included in measures to prevent problem behaviors in the classroom (e.g., Farmer, McAuliffe Lines, & Hamm, 2011). Results from the present study suggest that for students with ID no quick conclusions on the same pattern of effects as in typical development can be made given that we did not find a classroom peer effect for the overall level of problem behaviors. In contrast, peer influence susceptibility could be more domain-specific in ID which would also have to be acknowledged in the potential development of classroom-level prevention measures.

Implications for research from our results should be discussed in the context of the broader evidence from studies on susceptibility to social influence (e.g., Klemfuss & Olaguez, 2018), outer-directedness (Bybee & Zigler, 1998), and in situ peer processes in ID (e.g., Bexkens et al., 2018; Egger et al., 2021; Wagemaker et al., 2020). The picture emerging from these different research directions is still fragmented as study results are not directly comparable. For example, different mechanisms may underlie in situ learning processes tested in laboratory-based experimental studies and longitudinal socialization processes investigated at school. Also, experimental studies typically include only students with less severe forms of ID, while in the present field-based study students from the whole spectrum of ID were included which might affect the results. Bringing these ends together is challenging but with more research on these issues, a focus on replication, and the use of different approaches in the same studies, it will be possible to further understand how peers affect the development of students with ID.

When replicated, our findings may provide perspectives for the practical support of students with ID. One relates to the question which classroom composition benefits students with ID the most. Our exploratory analyses suggest that the *mean* classroom levels of anxiety, problems relating socially, and communication disturbances affect individual development of these behaviors. To decide where to place a student with such problems within special needs schools, it may be advisable to choose a classroom where this same problem behavior is less present among the classmates (for similar conclusions regarding antisocial behavior among students without ID, see Dodge et al., 2006). In addition, the effects of within-classroom heterogeneity (i.e., positive effect on communication disturbance and reduction of peer influence on anxiety) suggest that when composing new classrooms, heterogeneity may be preferred over homogeneity in terms of students’ communicative disturbances and anxiety.

Besides reflections on students’ placements and classroom composition, teachers can also foster positive peer interaction and aim to prevent negative peer influence in their classroom. For example, studies in regular schools have shown that when students perceive their teacher as more emotionally and academically supporting, less negative peer influence on problem behaviors is observed (Müller et al., 2018; Shin & Ryan, 2017). Fortunately, peer influence is not only negative: susceptibility to peer influence can also mean positive peer learning processes between students (see also, Carter, 2018). If future studies should support the effect of peers on certain types of problem behaviors in students with ID, it may therefore be a useful strategy for teachers to point students’ attention to fictional or real peers who can serve as positive role models beneficial to a decrease of individual problem behavior.

4.2. Strengths, limitations, and future perspectives

To our knowledge, this is the first study to examine the influence of classmates on problem behaviors in special needs schools for students with ID. We used a longitudinal design and well-established methods from peer influence research. Due to the large sample size, the high participation rates per classroom, and the control of key variables, reliable information on the effects of classmate characteristics in special needs schools was gained.

A limitation of this study was that our data collection relied solely on school staff. Information on problem behaviors reported by school professionals is reliable and valid (e.g., Einfield & Tonge, 1995; Goodman, 2001) and our approach yielded detailed information for a large number of students. Nevertheless, our results require replication with other assessment methods, such as direct observation or parent reports. It would also be useful to conduct interviews that shed more light on the qualitative aspects of social influence

between students with ID. For example, such an approach could allow insights on the motives of children and adolescents with ID to potentially adapt their own behaviors to the peers' behaviors.

Research on peer effects in students with ID should also be extended to other school types and out of school settings, such as inclusive classrooms or leisure time programs. While currently in many countries a majority of students with ID attends special needs schools, inclusive schooling is progressing in many places. In inclusive settings, the behavioral problems of students with ID will deviate more from their classmates than in special needs schools. It is therefore an interesting direction for future research to examine to what extent the development of problem behaviors in students with ID will be influenced by the characteristics of typically developing classmates and out of school friends.

Given the goal of this study to examine classroom peer effects across a broad range of problem behaviors, we do not have evidence yet for underlying mechanisms. For the behaviors that tended to be influenced by classmates, follow-up studies should aim to replicate our results and examine the exact processes through which influence takes place. In this regard, bringing together different research lines is of crucial importance: Peer influence research on students with ID can benefit from the extensive knowledge on peer processes in typical development. The other way around, insights from studies investigating ID inform on the generalizability of findings on peer processes across settings and across students with different characteristics. Integrating field-based and experimental approaches further promises a better understanding of both the long-term effects and the micro mechanisms of peer socialization. At this point it is of special importance to get further insights in how peer socialization and outer-directedness in ID are related. For example, peer influence susceptibility may be one aspect of a general outer-directedness of students with ID. However, to date too less is known on whether outer-directedness of students with ID is universal or depends on the external source providing information (e.g., peers vs. adults vs. technical cues) and the behavioral domains to be influenced (see also, Egger et al., 2021).

More knowledge on peer effects and underlying mechanisms can also stimulate the development of targeted classroom-level interventions to promote positive peer influence. Future research should examine how effective it is to complement well-established intervention principles addressing individual challenging behaviors with a careful planning of classroom composition and support from teachers for positive interactions between students with ID.

In sum, this study showed that including the factor of peer ecology in the reflections on problem behavior development of students with ID contributes to a more complete understanding of these students' difficulties. The identified mixed picture of classmate effects indicates that research on this issue may not always result in the same patterns seen among students without ID and findings may vary across domains considered. It will now be important to replicate and differentiate the present findings in order to further advance our understanding of peer processes among students with ID.

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CRedit authorship contribution statement

Christoph M. Müller: Conceptualization, Funding acquisition, Investigation, Project administration, Supervision, Writing - original draft. **Antonius H.N. Cillessen:** Validation, Writing - review & editing. **Sara Egger:** Writing - original draft, Writing - review & editing. **Verena Hofmann:** Data curation, Formal analysis, Investigation, Methodology, Project administration, Writing - original draft, Writing - review & editing.

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