


# How to support peer resistance in adolescents with mild-to-borderline intellectual disability? Intervention development and feasibility

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## Abstract

**Background:** Adolescents with mild-to-borderline intellectual disability face peer resistance challenges, risking harmful or dangerous situations.

**Method:** We designed a peer resistance group intervention at school for adolescents with mild-to-borderline intellectual disability, tested its feasibility ( $N = 4$ ,  $M_{\text{age}} = 14.1$ ,  $M_{\text{IQ}} = 78.8$ ), adapted it, and tested it again ( $N = 6$ ,  $M_{\text{age}} = 15.0$ ,  $M_{\text{IQ}} = 72.8$ ).

**Results:** Study 1 demonstrated feasibility in recruitment, resources, and potential benefits on the distal outcome risk taking. However, attendance, obtained knowledge, and potential benefits on peer resistance, peer problems, and prosocial behaviour were suboptimal. Consequently, study 2 contained more learning by doing and individual lessons, resulting in higher attendance and greater personalization. While potential benefits on improved peer resistance measures were not observed, risk taking improved.

**Conclusions:** Despite finding no potential benefits on peer resistance, running a peer resistance intervention for adolescents with mild-to-borderline intellectual disability at school is considered feasible.

## KEYWORDS

adolescence, feasibility, intervention development, mild-to-borderline intellectual disability, peer resistance

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## 1 | INTRODUCTION

I met these guys in a lounge. They were a few years older than me. One guy said, 'Who wants some fast money? I've got a nice offer!' and my friend and I were up for it. They wanted us to steal a scooter outside. I know how to do that, so it seemed like an easy way to make money. My friend wasn't sure, but the guys convinced him by saying 'Don't be such a pussy. Nothing can happen to you'. So, we had a deal. We went outside. I tried to force the lock while my friend was keeping a lookout, but then we heard sirens and we quickly tried to get away on our own scooter. Unfortunately, the police were faster than us, and we got arrested.

- Case example of a 16-year-old adolescent boy

Adolescents are highly sensitive to influences from their peers (Prinstein et al., 2011). Such peer influences can be considered negative when adolescents increase their sexual risk taking, substance use, and delinquency (Henneberger et al., 2021; Hoeben & Thomas, 2019; Widman et al., 2016). Peer resistance is defined as standing up to such negative peer influences and refusing to conform to peers' requests (Steinberg & Monahan, 2007). Adolescents with mild-to-borderline intellectual disability have limited adaptive and cognitive functioning which may contribute to a lower resistance to peer influence (De Beer, 2016; Dekkers et al., 2017). Compared to typically developing adolescents, adolescents with mild-to-borderline intellectual disability indeed take more risks under peer influence in laboratory tasks (Bexkens et al., 2019; Wagemaker et al., 2020, 2022). In daily life, they show high risk taking (Emerson, 2003; Segeren et al., 2018) and are overrepresented in criminal justice (Kaal, 2016), which could be due to a high susceptibility to negative peer influence. Therefore, it seems relevant to support the development of higher peer resistance of adolescents with a mild-to-borderline intellectual disability through intervention.

School interventions can be effective in increasing peer resistance in typically developing adolescents. For example, adolescents who followed the *Fourth R* curriculum showed improved negotiating and delaying as well as less yielding to peer influence compared to adolescents who followed standard classes (Wolfe et al., 2012). Also, adolescents following the *Keepin' it REAL* curriculum used more resistance strategies than adolescents in a control group (Hecht et al., 2008).

To our knowledge, there is currently only one intervention available that specifically targets peer resistance in adolescents with an intellectual disability: *Peers Engaged in Effective Relationships-Decision Making* (PEER-DM; Khemka et al., 2016). PEER-DM was designed for adolescents (14–21 years) with developmental disabilities (e.g., severe developmental delays, intellectual disabilities, or autism spectrum disorders) to support their social interpersonal decision-making (Hickson & Khemka, 2013; Khemka et al., 2009). It uses a cognitive approach to increase awareness of potential hazards of negative peer influence and to teach a four-step strategy for making effective decisions: (1) identifying a situation as a problem; (2) generating

alternatives; (3) considering possible consequences of each alternative; and (4) choosing a course of action (Khemka et al., 2016). The intervention consists of six group lessons (45–60 min) provided at school. In a first study (Khemka et al., 2016), 22 adolescents who followed PEER-DM perceived more risks of going along with negative peer influence and made more self-protective decisions in peer influence vignettes relative to 20 adolescents in the control group. We reasoned that such an intervention could also be helpful for adolescents with mild-to-borderline intellectual disability as they experience similar decision-making limitations such as difficulties with comprehending social situations, generating choices, and anticipating negative effects of risky actions (Bexkens & Müller, 2021; Hickson & Khemka, 2013; Van Rest et al., 2019).

Here, we aimed to develop a novel peer resistance intervention and tested both feasibility of the intervention design and the study procedures in adolescents with mild-to-borderline intellectual disability at school. Feasibility studies are highly important to evaluate the practical considerations of novel interventions and their potential benefits, thereby informing future larger trials (Wight et al., 2016). We evaluated five objectives (Orsmond & Cohn, 2015): (1) recruitment capability; (2) data collection procedures and outcome measures; (3) acceptability and suitability of the intervention; (4) resources to manage and run the study and intervention; and (5) adolescents' preliminary response to the intervention. Study feasibility is reflected in our objectives 1, 2, and 4 and intervention feasibility is reflected in objectives 3 and 5. Data relevant to these five questions (Table 1) can inform modifications to the peer resistance intervention and subsequent research. Indeed, after the first study, some feasibility objectives were improved for a second study.

## 2 | STUDY 1

With permission and input from the PEER-DM authors, we translated PEER-DM to Dutch. Essential guidelines for effective interventions for adolescents with mild-to-borderline intellectual disability include fine-tuning communication, using concrete exercise materials, and focusing on generalisation of learned skills (De Wit et al., 2011). Therefore, we made substantial adaptations to the content of the intervention and assessments (see Table 2).

Intervention prototype 1 had two goals. First, it aimed to improve the recognition of negative peer influence (as opposed to positive peer influence). Negative peer influence was defined as: 'peers trying to convince you to do things that can get you into trouble or that you do not want to do'. Positive peer influence was defined as: 'peers trying to convince you to do things that are good for you and that you want to do, or they help you to stop doing something dangerous'. Second, it aimed to teach a four-step decision-making strategy to find out that saying no is the most optimal choice during negative peer influence. Prototype 1 consisted of eight weekly group lessons provided by two therapists: the first author together with one registered school psychologist. Lessons took about 90 min, which typically consisted of two activities with a 10-min break halfway (see Appendix A

**TABLE 1** Feasibility objectives, questions, data collected, and analysis.

Feasibility objective	Specific objective-linked questions	Data collected	Analysis
Objective 1: Evaluation of recruitment capability	1a. What are the recruitment rates? 1b. How suitable are the eligibility criteria? 1c. How relevant is the intervention to the intended population? <sup>a</sup>	1a. Adolescents recruited and permissions obtained 1b. Adolescents fitting inclusion criteria 1c. Learning goals and motivation	1a. Number of successfully recruited and percentage of permissions obtained 1b. Percentage inclusions 1c. Description of learning goals and average motivation
Objective 2: Evaluation of data collection procedures and outcome measures	2a. Do participants understand the outcome measures and data collection procedures? 2b. Are participants willing and able to complete the outcomes measures?	2a. Observations during data collection 2b. Number of completed and missing data points	2a. Qualitative description 2b. Percentage of missing data
Objective 3: Evaluation of acceptability and suitability of intervention	3a. Are participants willing and able to complete the full intervention? 3b. Does the intervention involve a manageable amount of time for participants? 3c. Do participants perceive the intervention as acceptable and appealing?	3a. Dropouts and attendance rates 3b. Observations during lessons and data collection 3c. SRS-C, overall grade, interviews with participants and observations	3a. Number of drop-out and percent attendance 3b. Qualitative description 3c. Mean SRS-C score, overall grade, and content analysis of interviews and observations
Objective 4: Evaluation of resources to manage and run the study and intervention	4a. Does the research team have the administrative capacity, expertise, skills, space, and time to conduct the study and intervention? 4b. Is the technology and equipment sufficient to conduct the study and intervention?	4a. Evaluation of research team's resources 4b. Evaluation of schools' and participants' resources	4a and 4b. Qualitative description
Objective 5: Preliminary evaluation of participants' response to intervention	5a. Do participants experience changes in peer resistance over the course of the intervention? 5b. Do participants decrease their risk taking and mental health problems after the intervention?	5a. Diary questions; ADMS and RPI (study 1) or teacher observations (study 2) 5b. RTQ and SDQ	5a. Qualitative description of results, pre-post <i>t</i> -tests and effect sizes (study 1), and <i>N</i> = 1 analyses (study 2) 5b. Pre-post effect sizes

<sup>a</sup>Only assessed during study 2.

in Data S1 for the content of the lessons). All lessons were filmed and observed by two research assistants. To ensure that adolescents felt comfortable, the camera was placed on a stative and directed at the therapists. This study was reviewed and approved by the university's ethical review board. As this study ran during a semi-lockdown due to the COVID-19 pandemic (April–June 2021), social distancing rules were followed.

## 2.1 | Methods

### 2.1.1 | Objective 1: Recruitment capability

Multiple practical vocational schools showed enthusiasm for the intervention, and we selected one school where we could collaborate with the school psychologist. In the Netherlands, practical vocational

schools have the following admittance criteria: an IQ between 55 and 80 on a standardised IQ test measured no more than 2 years prior to admittance and learning delays of 50% or more in at least two educational areas (i.e., mathematics, reading accuracy and fluency, reading comprehension, and spelling). We aimed to recruit one intervention group consisting of four to six adolescents with mild-to-borderline intellectual disability between 14 and 17 years at their practical vocational school. School teachers were instructed to recruit adolescents based on perceived potential profit from the intervention. Recruited adolescents were shown a video about the study and received an information letter for their parents who were called before providing online active informed consent. All adolescents were older than 12 years and provided consent after their parents provided consent.

Inclusion criteria were an IQ between 50 and 85 and below average adaptive functioning (norm score lower than 85; Harrison & Oakland, 2015). IQ was estimated with the shortened Wechsler

**TABLE 2** Changes from PEER-DM to Prototype 1 to Prototype 2.

	PEER-DM	Rationale for change (based on De Wit et al., 2011)	Prototype 1	Rationale for change (see Table 3)	Prototype 2
Content of lessons	Goal 1: Recognition of negative peer influence by abstract definition	Not applicable	Goal 1: Similar to PEER-DM	Make information more concrete	Goal 1: Recognition of negative peer influence by statements of peers and own feelings
	Goal 2: Hypothetical decision-making (i.e., consider multiple choices, saying 'no' is optimal)	Enhance generalisation of peer resistance to daily life	Goal 2: Hypothetical decision-making and generalisation of peer resistance	Simplify information, walking away can also be optimal	Goal 2: Teach behavioural repertoire of saying no or walking away
	Vignette stories as peer influence examples	Support visual information processing	Videos as general peer influence examples (see OSF for an example video)	Connect better to adolescents' experiences	Addition of individual lessons with focus on personal examples and motivational interviewing techniques (Frielink & Embregts, 2013)
	Directive instructions	Check understanding and connect to adolescents' experiences	Interactive instructions	Too cognitive, adolescents want to move	More learning by doing (i.e., modelling, emotion instruction, training social scripts)
	Six lessons of 30–45 min	More time for content and interaction	Eight lessons of 90 min	Meet adolescents' learning needs	More, shorter and more frequent group lessons: 12 bi-weekly lessons of 45–60 min
Assessment	Hypothetical decision-making (ADMS)	Assess generalisation of peer resistance to daily life	Hypothetical decision-making (ADMS and RPI) and resistance in real life contexts (diary)	No improvements on hypothetical instruments, focus more on generalisation	Daily-life peer resistance (diary questions and teacher observations)
	Self-report of decision-making under peer influence	Potential different views on peer resistance	Self-report of peer resistance plus other-report (parents, teachers)	Memory and self-reflection issues of adolescents (Emerson et al., 2013)	Addition of experimental assessment (DOSPERT-peer)
	No distal outcomes	Assess generalisation to distal outcomes	Distal outcomes: risk taking (RTQ) and mental health problems (SDQ)	Not applicable	Similar to Prototype 1
	Analysis of group patterns	Quantitative results do not suit small sample size	Qualitative analysis and Reliable Change Index	Varying individual change patterns	$N = 1$ analyses for peer resistance (Maric et al., 2015)

Intelligence Scale for Children-V (WISC-V) consisting of the subtests Vocabulary and Matrix Reasoning, which are reliable and correlate highly with total intelligence (Na & Burns, 2016; Pierson et al., 2012; Sattler, 2001). Problems in adaptive functioning were reported by teachers on the Adaptive Behavior Assessment System-3 (ABAS-3; Harrison & Oakland, 2015). The ABAS-3 describes 174 competencies in the domains of conceptual, social, and practical skills, the mastery of which is assessed on a scale from zero (not able to do this behaviour) to three (always or almost always when needed). Exclusion criteria were a diagnosis of autism spectrum disorder and following other interventions simultaneously.

## 2.1.2 | Objective 2: Data collection procedures and outcome measures

Proximal outcomes focused on peer resistance in both hypothetical and daily life peer influence situations. Two distal outcomes were also assessed. First, as assertive responses to peer influence have been associated with less risky sexual behaviour and substance use (Caplan et al., 1992), we assessed adolescents' risk taking. Second, as resisting negative peer influences may improve peer relationships, we assessed whether improved peer resistance could also lead to decreased peer problems and increased prosocial behaviour (see Appendix C in

**TABLE 3** Qualitative feedback on peer resistance intervention prototype 1 and 2 lessons.

Category	Feedback on prototype 1	Feedback on prototype 2
Obtained knowledge	<ul style="list-style-type: none"> <li>On the knowledge questions, adolescents had difficulty differentiating positive and negative peer influence, remembering new concepts, and nuanced behavioural choices (T<sup>†</sup>)</li> <li>Adolescents had knowledge of characteristics of negative peer influence (T)</li> <li>When rehearsing content of the previous lesson, little was remembered (T)</li> <li>Adolescents stated that they already knew content (A), but had difficulty to formulate what they learned when asked (T)</li> </ul>	<ul style="list-style-type: none"> <li>Adolescents showed knowledge of characteristics of negative peer influence (T<sup>†</sup>)</li> <li>Saying no and standing strong were shown during role plays (T)</li> <li>Adolescents stated that they already knew content (A)</li> <li>Rehearsal with own input improved memory of the previous lesson (T)</li> <li>At the end, four adolescents (66.7%) indicated that non-verbal peer resistance skills were still difficult (e.g., looking somebody in the eye, staying calm; A)</li> </ul>
Valued components	<ul style="list-style-type: none"> <li>Learning by doing was highly appreciated by adolescents (T and A)</li> <li>Role plays elicited more engagement and comprehension (T)</li> <li>Visual support such as pictures and icons increased interaction (T)</li> </ul>	<ul style="list-style-type: none"> <li>Role plays with attributes (e.g., music) and actor were appreciated (T and A)</li> <li>Learning by doing had impact and led to improved self-knowledge (T and A)</li> <li>Visual support such as pictures and Playmobil increased interaction (T)</li> <li>Individual sessions were effective to work on personal examples/learning goals (T)</li> <li>Video feedback worked well for three adolescents (50%) who participated in role plays (T)</li> </ul>
Challenges	<ul style="list-style-type: none"> <li>Lessons with many cognitive elements decreased concentration and led to confusion of the group (T)</li> <li>Adolescents disliked lessons that included too much sitting (paper-and-pencil exercises) and little physical activity (A)</li> <li>During peer influence examples adolescents focused more on the moral aspects of risk taking than on whether the peer influence was positive or negative (T)</li> <li>Adolescents had difficulty coming up with personal examples (T)</li> <li>Not all adolescents enjoyed making the group video (A)</li> <li>Adolescents indicated that saying no is not always the best behavioural choice, in some cases ignoring or walking away works better (A)</li> <li>Finding a balance between rehearsal and speed in explanations (T)</li> </ul>	<ul style="list-style-type: none"> <li>With some encouragements, adolescents were able to mention what they learned, but we were unable to pursue with this after lesson 6 (T)</li> <li>One adolescent said that he did not feel safe to practice with role plays (A)</li> <li>Little input and enjoyment during making the group video (T and A)</li> <li>Some adolescents thought that practising with their own personal example was too confronting, better to anonymize personal examples (A)</li> <li>Resistance against roleplays in lesson 8: one adolescent denied participating in a role play, then all others denied as well (T)</li> <li>Adolescents had difficulty practising walking away in role plays (feels like failing; T)</li> </ul>
Time issues	<ul style="list-style-type: none"> <li>Lessons (90 min) were too long to concentrate for some adolescents (T and A)</li> <li>Lessons were too infrequent (once a week) to remember information (T)</li> <li>After the 10-min break halfway adolescents seemed less engaged and motivated (T)</li> <li>Waiting for editing of group video took too long (T)</li> </ul>	<ul style="list-style-type: none"> <li>Duration of group lessons (60 min) and individual lessons (30 min) was good (T)</li> <li>Higher frequency (twice a week) helped to remember information (T)</li> <li>Twelve lessons may be too many (T)</li> </ul>

<sup>†</sup>Abbreviations represent the source of qualitative feedback: T = therapists, A = adolescents.

Data S1 for more outcome measure information). All materials were administered as pre-post assessments. Measurements for adolescents took place individually in a separate room. Parents and teachers filled out the questionnaires online.

#### *Hypothetical peer resistance*

Peer resistance in hypothetical peer influence situations was assessed using the Adolescent Decision-Making Scale (ADMS; adapted from Khemka et al., 2016) and the Resistance to Peer Influence Scale (RPI; Steinberg & Monahan, 2007). In the ADMS, adolescents listened to 10 audio vignettes about peer influence via headphones and could read along via paper. Vignettes were recorded to account for potential

reading disabilities. Based on a focus group with four typically developing adolescents and advice from a school psychologist working on a vocational school, we adapted the contents of the vignettes to better suit Dutch adolescents. Moreover, we developed extra vignettes to create three different versions for the two measurement points and counterbalanced these versions over the adolescents. The topics addressed in the ADMS were substance use, antisocial behaviour, rule breaking, naivety, which were similar to the topics of the peer influence example videos used during the intervention (see Appendix D in Data S1 for a video sample transcript). Apart from using the same topics, we did not assess the equivalence of the different versions nor altered the sequence of vignettes within a version. After each

vignette, the test assistant asked the adolescent ‘What is the best thing for X to do?’ and ‘What could happen if X decides to go along?’. Sum scores for effective decision-making (i.e., 1 for peer resistance, 0.5 for ignorance/getting help, 0 for going along) and risk perception (i.e., 1 for at least one correct negative consequence, 0 for incorrect or no negative consequences of going along) were calculated separately. To control for response tendencies, we also added two vignettes on positive peer influence.

For the RPI, adolescents filled out the original version and parents and teachers filled out an adapted version. The RPI consisted of 10 questions using a tree-based structure, responses were provided on the computer. We did not provide audio recordings, as the RPI has been used successfully in the MBID population before (Dekkers et al., 2017). Adolescents first practised one example question with the research assistant and were instructed to ask for help if they had difficulty understanding the items. Scores on each item were aggregated into a 4-point Likert-type scale score. The outcome was the total score, higher scores indicated more resistance to peer influence.

#### *Daily-life peer resistance*

Adolescents filled out daily diary questions on their phone 7 days before and 7 days after the intervention. The main multiple-choice questions were ‘Did you encounter negative peer influence today?’ (yes/no) and ‘How did you react to the negative peer influence?’ (say no/walk away/ignore/go along/other). The outcomes were the sum of negative peer influence occasions before and after the intervention and the selected choices. Adolescents could earn seven euros before and after the intervention by filling out the diary every day. Diary links were sent out via WhatsApp at 18:00. When the diary was not filled out yet, reminders were sent at 20:00, 22:00, and a final reminder at 8:00. Although the questions on peer resistance were newly developed, similar approaches proved reliable and valid in (young) adults with intellectual disability to capture mood, substance abuse, or psychopathology (Hulsmans et al., 2023; te Brinke et al., 2021; Wilson et al., 2020).

#### *Distal outcomes*

To assess risk taking, adolescents were interviewed about the frequency of 28 daily-life risky activities in the Risk Taking Questionnaire (RTQ; adapted from Dekkers et al., 2021). Adolescents verbally indicated how frequently they performed these actions (never/less than once a month/once a month/two-to-three times a month/every week), and if they ever experienced peer influence on this action, they were asked to give an example. The outcomes were the total scores, higher total scores indicated more risk taking (under peer influence). To assess peer problems and prosocial behaviour, adolescents, parents, and teachers filled out the Strengths and Difficulties Questionnaire on the computer (SDQ; Goodman et al., 2000). Research assistants provided extra explanations to adolescents if necessary. The SDQ consisted of five subscales: Hyperactivity, Emotional Symptoms, Conduct Problems, Peer Problems, and Prosocial. We only assessed the Peer Problems and Prosocial subscales.

### 2.1.3 | Objective 3: Acceptability and suitability of the intervention

Adolescents filled out the Session Rating Scale-Child version (SRS-C) at the end of each lesson (Duncan et al., 2003). This paper-and-pencil scale consisted of four items; we only used the overall score for the lesson on a 10-point scale (see Appendix C in Data S1 for more information). After the intervention, we conducted semi-structured interviews with all adolescents. The 16 multiple-choice knowledge questions of the Adolescent Knowledge of Concepts scale (Khemka et al., 2016) were adapted as we expected ceiling effects because we targeted a higher functioning group. We solved this by creating 12 more difficult open questions on which information adolescents had remembered from our lessons. Then, we asked adolescents to give their opinion on the intervention and some specific activities, and to give an overall grade.

### 2.1.4 | Objective 4: Resources to manage and run the study and intervention

We evaluated the research team's resources in terms of expertise and division of tasks, schools' resources by the availability of rooms and materials, and participants' resources by access to the required administration devices.

### 2.1.5 | Objective 5: Participants' response to intervention

For the diary questions, we qualitatively described the frequency of negative peer influence occasions and the selected choices. For the ADMS, RPI, and RTQ, we qualitatively described the pattern of results such as individual decreases or potential ceiling effects. For the SDQ, we calculated reliable change indices (RCI) for each adolescent.

## 2.2 | Results

### 2.2.1 | Objective 1: Evaluation of recruitment capability

We successfully recruited five adolescents. One adolescent received individual behavioural support at school and his teacher was hesitant about letting him participate in the intervention. As this support could not be classified as an official intervention, the research team elaborately explained the content of peer resistance intervention to the teacher and then the teacher agreed to let the adolescent participate. All parents and adolescents gave permission to participate and were eligible based on their IQ and adaptive functioning.

## 2.2.2 | Objective 2: Evaluation of data collection procedures and outcome measures

All self-report data was complete. Four adolescents had some difficulty understanding the items of the RPI, RTQ, and/or the SDQ and received extra explanations or items were read aloud. Two adolescents showed signs that the ADMS was too long to concentrate. Adolescents indicated that getting a monetary reward and receiving regular reminders, helped them to be motivated to fill out the questions. One parent did not fill out the parent questionnaires due to language difficulties. All teacher reports were complete.

## 2.2.3 | Objective 3: Evaluation of acceptability and suitability of the intervention

After lesson 4, one adolescent (20%) dropped out. She indicated there was not a lot to be learned from the lessons. The final sample consisted of four adolescents (three boys, one girl,  $M_{\text{age}} = 14.06$ , range 13.52–14.48 years,  $M_{\text{IQ}} = 78.8$ , range 65–85,  $M_{\text{ABAS-3percentile}} = 7.3$ , range: 4.2–14.3). The average attendance rate was relatively low, 62.5%. Potential explanations could be low motivation of adolescents and flexible school schedules related to COVID-19, making adolescents forget to attend. To solve this, adolescents could receive one euro for attendance to the lessons from lesson 6 onwards. However, this was not effective to raise the attendance. On the SRS-C, the mean overall score for lessons was 7.97 out of 10 (range 7.45–9). This was in line with the overall grade for the training provided by adolescents after the training ( $M = 8.25$ , range: 7–9.5). Table 3 provides a summary of the interviews and observations.

## 2.2.4 | Objective 4: Evaluation of resources to manage and run the study and intervention

Our team consisted of two therapists (a school psychologist and the first author), four researchers (two professors, two scientist-practitioners) with expertise with adolescents mild-to-borderline intellectual disability and evidence-based interventions, and two research assistants (master students). School provided testing rooms and a classroom with a digital board for the lessons, the research team was responsible for the study design and measurements. Therapists pre-discussed and evaluated lessons weekly with the scientist-practitioners using video recordings. Research assistants sent out the diary questions and reminders. They divided the work equally, doing this took about 5–15 min per day. Adolescents used their own smartphone to fill out the diary questions, they could use all required apps (WhatsApp and Qualtrics via internet). One parent did not have access to a computer for the permission and did this via a paper-and-pencil form.

## 2.2.5 | Objective 5: Preliminary evaluation of participants' response to intervention

Results on peer resistance were absent or highly mixed, which complicated their interpretation. To illustrate absence, in the diary before the intervention, only one adolescent reported peer influence on 1 day. This adolescent selected the following reactions in response to peer influence: ignoring, saying no and getting angry. After the intervention, none of the adolescents reported peer influence on any of the diary days. To illustrate the mixed responses, one adolescent showed an increase in ADMS effective decision-making, two remained relatively stable, and one deteriorated. On the ADMS risk perception, all adolescents scored close to the maximum score both at pre- and post-test (i.e., ceiling effect). On the RPI, two adolescents increased on peer resistance according to all informants, the other two adolescents showed a mixed pattern of increasing, stable, and decreasing scores. Remarkably, adolescents indicated more peer resistance than parents and teachers. Results on the distal outcomes were also mainly mixed but promising on RTQ risk taking under peer influence: two adolescents decreased, while two adolescents remained stable (see Appendix E in Data S1 for more information).

## 2.3 | What we learned from study 1

We conclude that recruitment capability (objective 1) and resources and ability to run the study and intervention (objective 4) were feasible. However, several aspects related to acceptability of the intervention were suboptimal: activities including cognitive elements, motivation to attend to the lessons, obtained knowledge, and time issues of the intervention (objective 3). Potential benefits on peer resistance in hypothetical situations were limited and individual differences were large. We were not able to assess potential benefits on daily life peer resistance as most adolescents never reported peer influence in their diaries. Although this could be realistic, other explanations could be that the diary period was too short, diary questions were too abstract, adolescents had memory issues, or were simply not aware of peer influence. Thus, the proximal outcome measures for peer resistance could be more refined and personalised to capture potential benefits to the intervention (objectives 2 and 5). Also, more regular checks for understanding between the lessons could be useful. Potential benefits on risk taking were promising, while the effects on peer problems, and prosocial behaviour were mixed.

## 3 | STUDY 2

To improve the acceptability and suitability of the intervention (objective 3), we made several adaptations to prototype 1 (see Table 2). Intervention prototype 2 aimed to teach adolescents two skills: (1) recognition of negative peer influence situations through hurtful or

pushing statements of peers and through own feelings of tension elicited, and (2) refusing to conform to negative peer influence by saying no or walking away. It consisted of 12 bi-weekly lessons (nine group lessons and three individual lessons) provided again by two therapists. The individual intake started with broad questions about adolescents' goals in life, which eventually narrowed down to whether recognising peer influence and saying no could contribute to reaching these goals. Group lessons took about 45–60 min, and typically consisted of one or two short activities (mostly learning by doing or role plays; see Appendix B in Data S1 for the content of the lessons). Individual lessons took about 15–30 min and focused on personal learning goals, checks of the obtained knowledge, evaluation of group lessons, and video feedback. For the video feedback lessons, the trainers explained that the camera was now aimed at the adolescents and that the video recordings would only be shown to the trainers and the concerned adolescent. This study was reviewed and approved by the university's ethical review board.

### 3.1 | Methods

#### 3.1.1 | Objective 1: Recruitment capability

We selected a practical vocational school from the same organisation as the school of study 1. Recruitment and eligibility were identical to study 1.

#### 3.1.2 | Objective 2: Data collection procedures and outcome measures

Pre- and post-tests regarding inclusion and distal outcomes (i.e., WISC-V, ABAS-3, RTQ, and SDQ) were identical to study 1. As the intervention period was longer than the baseline period, we used 14 daily assessments during baseline, and 18 assessments (twice a week) during intervention. As reminders and monetary rewards worked well in study 1, we again sent out reminders when the diary was not filled out. Moreover, adolescents could now earn 10 euros after the baseline and after the intervention by filling out the diary every day. The observations and other procedures were identical to study 1. See Appendix C in Data S1 for more detailed outcome measure information.

##### *Motivation*

During the intake, adolescents were first asked about their definition of motivation and extra instructions were provided if necessary. Then, adolescents answered five questions regarding their motivation to follow the intervention (e.g., 'How interested are you in the intervention?'). They indicated their answers on a motivation thermometer ranging from 0 (totally no motivation) to 10 (very high motivation). The outcome was the average score, with higher scores indicating higher motivation.

##### *Daily-life peer resistance*

We improved the diary by asking concrete and personalised questions over a longer time period. Adolescents indicated on their phone their daily activities with peers (i.e., 'Did you spend time with peers today?' (yes/no) and if yes, the open question: 'What did you do?'). Also, personal risk-taking behaviours which were encouraged by peer influence previously, were gathered with the RTQ pre-test. For both the peer activities and the risk-taking behaviours, we asked multiple-choice questions about peer influence occasions ['Did you get into trouble?' (yes/no) and 'Did you do something against your will?' (yes/no). If one of these was answered with yes: 'Was this because your peers pushed or pressured you?' (yes/no)] and subsequently about peer resistance ['Did you say no?' (yes/no) and 'Did you walk away?' (yes/no)], both supported by pictures. Peer resistance was calculated as percentage of peer influence occasions saying no and/or walking away. The maximum daily score was 100%, indicating saying no and/or walking away during all peer influence occasions.

Additionally, teachers observed adolescents' peer resistance in the classroom. Before the baseline started, teachers indicated three behaviours demonstrated under peer influence. Per behaviour, they filled out two questions: 'to what extent did X demonstrate behavior Y under peer influence today?' ranging from 'never' to 'a lot', and 'how did X react to the peer influence on behavior Y?' with 'going along', 'saying no', 'walking away/ignore' and 'not applicable' as options. Observations could be filled out via paper-and-pencil forms or online. Teachers observed adolescents daily during the baseline (10 schooldays) and twice a week during the intervention (18 schooldays). Also here, we selected these measurement frequencies because the intervention period was longer than the baseline period. Teachers received reminders to fill out the observations on days that they were teaching to the adolescents.

##### *Experimental peer resistance*

As additional part of the diary, adolescents performed the Domain Specific Risk Taking Scale with a risk encouraging peer manipulation (Blankenstein et al., 2021). Adolescents indicated perceived risks and benefits of hypothetical risk-taking behaviours before and after they saw the judgement of a group of virtual peers. Peer resistance was calculated as the difference between the rating without peers and the rating with peers divided by the relative peer manipulation strength for perceived risks and benefits separately. 0-scores indicated no peer resistance, while 1-scores indicated high peer resistance (see Appendix F in Data S1 for more information). At the post-intervention interview, adolescents indicated the credibility of the peer manipulation on a 10-point scale.

#### 3.1.3 | Objective 3: Acceptability and suitability of the intervention

We removed the knowledge questions after the intervention and only asked adolescents to give their opinion on the intervention and some



specific activities, and to give an overall grade. All other acceptability and suitability assessments were identical to study 1.

### 3.1.4 | Objective 4: Resources to manage and run the study and intervention

The evaluation of resources was identical to study 1.

### 3.1.5 | Objective 5: Participants' response to intervention

For peer resistance, we performed  $N = 1$  analyses (Maric et al., 2015) using the freely available  $N = 1$  E-clip application (Agelink van Rentergem & Huizenga, 2016). We again reported the pattern of results on the distal outcome RTQ risk taking and the RCI's for SDQ peer problems and prosocial behaviour.

## 3.2 | Results

### 3.2.1 | Objective 1: Evaluation of recruitment capability

We successfully recruited seven adolescents. One of them did not get permission to participate in the study, leaving a sample of six adolescents who were eligible based on their IQ and adaptive functioning. During the intake, four adolescents indicated one or two learning goals related to peer influence (e.g., earlier recognition of negative peer influence or learning to say no without others getting angry). Two adolescents indicated that they did not have learning goals related to peer influence. Nevertheless, as teachers selected them based on high peer influence susceptibility which could be related to serious problems (i.e., getting in touch with the police, street fights), we decided to include them in the intervention. Average motivation during the intake was 7.5 out of 10 (range 5.8–8.7).

### 3.2.2 | Objective 2: Evaluation of data collection procedures and outcome measures

All pre- and post-intervention self-report data was complete. The diary data was complete for all adolescents during the baseline. However, on days 1–3 there was a technical error in the DOSPERT-peer, leading to some missing data. Also, when adolescents indicated zero risks of a risk-taking behaviour without peers on the DOSPERT-peer, the risk encouraging peer manipulation strengths of  $-1$  to  $-3$  could not be applied. Similarly, when adolescents indicated maximum benefits without peers, the peer manipulation strengths of  $+1$  to  $+3$  could not be applied. Therefore, scores on these days were removed (this happened on average on 17.9% of the days per participant, range: 0%–42.1%). Diary fill-out rates were high ( $M = 92.7%$ , range:

75%–100%). Adolescents again indicated that getting a monetary reward and receiving regular reminders, helped them to be motivated to fill out the questions. Two parent-report pre-tests (33.3%) and three post-tests (50%) were missing due to language difficulties and parental time issues. All teacher-report pre-tests were complete, two post-tests (33.3%) were missed due to teachers' time issues. For the observations, all teachers indicated that most peer influence occurs during breaks or outside of school. On average, they indicated less than three classroom peer influence examples ( $M = 1.83$ ; range 1–3 examples) per adolescent with sometimes unclear links to peer influence (e.g., smartphone use). Also, daily observations during baseline where not feasible. That is, from the 10 baseline days, teachers observed on average only 3.83 days (range 3–5 days). The same applied for the intervention phase, teachers observed on average 12.5 days (range 6–24 days). Moreover, for teacher indicated peer resistance, 'not applicable' was filled out frequently ( $M = 35.5%$ , range 3.7%–76.9%). Consequently, relevant data was only collected on average on 2.55 days during the baseline (range 1–5 days) and 9.64 days during the intervention (range 4–23 days).

### 3.2.3 | Objective 3: Evaluation of acceptability and suitability of intervention

None of the adolescents dropped out. The final sample consisted of six male adolescents ( $M_{\text{age}} = 15.04$ , range: 14.2–15.94,  $M_{\text{IQ}} = 72.8$ , range: 68–82,  $M_{\text{ABAS-3percentile}} = 8.9$ , range: 1.4–34.5). One adolescent scored too high on the ABAS-3, but we decided to still include him in the intervention because (a) his high motivation to attend the intervention (i.e., score 8.7 out of 10) and (b) we expected him to profit from the intervention considering his fitting learning goals (i.e., learning how to say no without others getting angry' and 'recognizing who is a real friend and who is fake'). Attendance to the lessons was high ( $M = 95.8%$ , range 91.6%–100%). On the SRS-C, the mean overall score for lessons was 7.65 out of 10 (range 6.9–8.8). This was in line with the overall grade for the training provided by adolescents after the training ( $M = 7.0$ , range: 6–8). Table 3 provides a summary of the interviews and observations on prototype 2.

### 3.2.4 | Objective 4: Evaluation of resources to manage and run the study and intervention

The team composition was similar to study 1, except that we now included five research assistants (master students). Two individual sessions were given by one therapist. As some group resistance was observed during lesson 8 (see Table 3), the other therapist joined the final individual lesson. Again, school provided the rooms and research assistants sent out the diary questions and reminders. Diary preparations took a few weeks as daily and personal links had to be developed. Assistants divided sending out the diary equally and doing this took about 15 min per day. Adolescents again encountered no problems to fill out the diaries on their own smartphone. One parent

(16.7%) had difficulty to understand the Dutch consent form and the SDQ. With help from an interpreter, this parent was informed by telephone and the forms were translated and provided on paper-and-pencil.

### 3.2.5 | Objective 5: Preliminary evaluation of participants' response to intervention

For daily-life peer resistance, we found no potential benefits (see all plots in Appendices H and G in Data S1). On self-indicated daily activities, none of the adolescents reported any peer influence during any of the days. For risk taking, five adolescents indicated too little peer influence occasions to make claims about peer resistance. One adolescent, participant 4, reported on peer resistance three times during the baseline and five times during the intervention, all his results were non-significant. For teacher observations, participant 3 unexpectedly showed less peer resistance to 'engaging with disruptive classmates' at the end of the intervention as compared to the end of the baseline ( $b = -0.90$ ,  $p = .01$ ). All other results were non-significant (three analyses could not be performed due to too little data or variance).

For experimental peer resistance, we only found a potential benefit for participant 1: he was more peer resistant on the DOSPERT-peer perceived benefits at the end of the intervention as compared to the end of the baseline ( $b_1 = 0.41$ ,  $p = .048$ ). Two analyses could not be performed due to too little variance, all other results were non-significant (see Appendices I and J in Data S1).

Regarding the distal outcomes, results on risk taking were mainly promising: four adolescents decreased in RTQ general risk taking, while one remained stable and one increased, moreover four decreased in RTQ risk taking under peer influence, while two remained stable. Results on the SDQ peer problems and prosocial behaviour were again highly mixed, which complicated their interpretation (see Appendix K in Data S1).

## 3.3 | What we learned from study 2

We conclude that the lessons of our second prototype suited adolescents better in terms of the type of activities, obtained knowledge and dosage of information (objective 3). Nevertheless, the two adolescents who did not indicate learning goals related to peer resistance during the intake displayed less serious involvement in the lessons which started to become a norm adapted by others. Although we extended the outcome measures for peer resistance to also include teacher observations and a behavioural outcome, we still encountered some challenges in their procedures and in obtaining sufficient data (objectives 2 and 5). In studies 1 and 2 combined, we tested five different measures to assess peer resistance (see Table 4). We conclude that each measure provides opportunities to capture different aspects of peer resistance, but also has its own challenges.

## 4 | DISCUSSION

This study aimed to develop and test the feasibility of a novel intervention to support peer resistance in adolescents with mild-to-borderline intellectual disability. We evaluated five feasibility objectives centred around (1) recruitment capability; (2) data collection procedures and outcome measures; (3) acceptability and suitability of the intervention; (4) resources to manage and run the study and intervention; and (5) adolescents' response to the intervention. Following the testing of prototype 1, prototype 2 was developed, and the feasibility objectives were reevaluated. Below, we assess each objective, identify study limitations, and offer recommendations for further intervention development.

### 4.1 | Evaluation of the intervention feasibility objectives

#### 4.1.1 | Objective 1: Recruitment capability

Enthusiasm for the intervention among practical vocational schools was high, and eligibility criteria proved suitable. Recruitment via teachers was also feasible, they reported that all included adolescents had serious problems related to peer resistance that could negatively impact their development. However, some adolescents themselves did not express learning goals related to peer resistance. It could therefore be debated whether the intervention was necessary for these adolescents. As individuals with intellectual disability may have limited self-reflection (Emerson et al., 2013) we argue that this should not negate the necessity of intervention for them. Nevertheless, a lack of insight could have lowered some adolescents' intrinsic motivation to participate, which may have negatively impacted the intervention effect.

#### 4.1.2 | Objective 2: Data collection procedures and outcome measures

Despite efforts to tailor outcomes and procedures to the needs of adolescents with mild-to-borderline intellectual disability (see also Kooijmans et al., 2022 for a review), assessing peer resistance sensitively and ecologically valid was challenging. This aligns with previous studies encountering difficulties in measuring social processes in individuals with intellectual disability (Kooijmans et al., 2022; Van Rest et al., 2014; Wilson et al., 2020). High completion rates were achieved for self-reports, but completion of parent and teacher reports could still be optimised by better assessing their needs in terms of resources and time.

#### 4.1.3 | Objective 3: Evaluation of acceptability and suitability of the intervention

The intervention seemed acceptable for adolescents. Across both studies, adolescents mostly appreciated the content of the lessons

**TABLE 4** Opportunities and challenges for the five peer resistance measures.

Instrument	Measure type	Opportunities	Challenges
Adolescent Decision-Making Scale (ADMS)	Structured interviews	<ul style="list-style-type: none"> <li>Concrete questions about vignettes</li> <li>Audio vignettes to account for reading disabilities</li> <li>Can capture intervention effects in ID-population (Khemka et al., 2016)</li> </ul>	<ul style="list-style-type: none"> <li>Assesses hypothetical peer resistance, not generalisation</li> <li>Manual scoring of ambiguous open answers was sometimes difficult for test leaders</li> </ul>
Resistance to Peer Influence Scale (RPI; self, parent, teacher)	Questionnaire	<ul style="list-style-type: none"> <li>Validated instrument for self-report (Steinberg &amp; Monahan, 2007)</li> <li>Can be adapted for parents and teachers</li> <li>Short duration</li> </ul>	<ul style="list-style-type: none"> <li>Tree-based question structure can be complex</li> <li>Some abstract questions or difficult words</li> <li>More about peer resistance trait instead of daily behaviour</li> </ul>
Daily diary	Diary report	<ul style="list-style-type: none"> <li>Assesses peer resistance in daily life</li> <li>Concrete questions and pictures possible</li> <li>Individualised and adaptive questions</li> <li>Monetary rewards lead to high fill-out rates</li> </ul>	<ul style="list-style-type: none"> <li>Little peer influence reported</li> <li>Potential comprehension, awareness, memory or reflection issues in self-report</li> <li>Motivation to fill out decreases over time</li> <li>No free app available to automatically send out links</li> </ul>
Teacher observations	Observational	<ul style="list-style-type: none"> <li>Concrete questions</li> <li>Individualised questions</li> <li>Short duration</li> <li>Fill out via paper-and-pencil or online</li> </ul>	<ul style="list-style-type: none"> <li>Difficulty to come up with relevant examples</li> <li>Daily observations not feasible (twice a week max)</li> <li>Unclear paper-and-pencil responses</li> <li>Observing peer resistance behaviour is difficult</li> </ul>
Domain Specific Risk Taking Scale (DOSPERT) with peer manipulation	Experimental task	<ul style="list-style-type: none"> <li>Measurement of peer resistance behaviour</li> <li>Differentiation into perceived risks and benefits</li> <li>Short duration</li> <li>Concrete and clear questions</li> </ul>	<ul style="list-style-type: none"> <li>Adolescents showed low belief in the peer manipulation (<math>M = 4</math> out of 10)</li> <li>No free app available to automatically send out links</li> </ul>

and graded the intervention as sufficient to good. Improvements from study 1 to 2 included decreased dropout rates, increased attendance rates, and resolution of some time issues. However, therapists noted that there may have been too many sessions in intervention prototype 2 for some adolescents, which may explain why adolescents indicated slightly lower satisfaction with the lessons of prototype 2 compared to prototype 1. Training time and dosage seemed relevant for adolescents' learning opportunities. It may be wise to adapt future prototypes such that they include frequent yet short lessons, as this suits the needs of adolescents with mild-to-borderline intellectual disability (De Wit et al., 2011). Group dynamics played a significant role during the intervention, with some adolescents exhibiting negative peer influence. Incorporating these dynamics into future versions of the intervention could enhance its suitability. Moreover, adolescents' motivation fluctuated during the intervention influenced by group dynamics. Future prototypes may benefit from assessing motivation multiple times. Also, as adolescents with mild-to-borderline intellectual disability may sometimes have difficulty to be motivated for abstract long-term rewards such as progress after an intervention (Vertregt & Collot d'Escury, 2015), more motivational interviewing sessions could be necessary.

#### 4.1.4 | Objective 4: Evaluation of resources to manage and run the study and intervention

The collaboration between the research team, school psychologist and schools was successful, and research assistants could help with intensive assessments such as the diaries. We did not yet assess the implementation under regular school conditions because our aim for now was to get a better overview of the required expertise and tasks. To enhance future implementation and the inclusion of more intervention groups, it will be beneficial to train school staff to deliver the lessons. On top of this, a classroom intervention could even be more feasible as well as providing opportunities to include the environment of adolescents.

#### 4.1.5 | Objective 5: Evaluation of adolescents' response to the intervention

We obtained mixed findings regarding adolescents' response to the intervention. Notably, no clear potential benefits on our proximal outcome of peer resistance were observed. This could be attributed to either ineffective intervention content or challenges in assessing peer

resistance (see suggestions for future research). Alternatively, adolescents may not improve in their peer resistance because they prioritise goals centred around peer acceptance or struggle to recognise peer influence situations (Bexkens & Müller, 2021).

Regarding distal outcomes, adolescents decreased or remained stable in their risk taking under peer influence after both prototypes. On the one hand, this result could suggest that the intervention improves risk taking regardless of improving peer resistance. On the other hand, it could suggest that peer resistance did improve but that we were not able to assess it reliably, and that this improvement led to decreased risk taking (Caplan et al., 1992). The results on peer problems and prosocial behaviour were mixed, which could indicate that these outcomes may have been too distal.

Furthermore, there were discrepancies between self-reports by adolescents and parent and teacher reports. To illustrate, problems with peer resistance were more often reported by parents and teachers than by the adolescents themselves. It is an open question who would be the best informant, what would the best method of measuring peer resistance, as well as what is optimal as a selection method for this intervention (see e.g., Emerson et al., 2013). Future studies should be aware of such discrepancies and might consider using direct observations of peer resistance to obtain more objective information (see e.g., Wolfe et al., 2012).

## 4.2 | Limitations and future directions

### 4.2.1 | Sample size

The results of these feasibility studies should be interpreted with caution due to the small sample sizes. While our primary aim was to test feasibility, larger sample sizes are essential for reliable assessment of effectiveness.

### 4.2.2 | Clarity of main message

The main message of the intervention regarding how to demonstrate peer resistance should be clear. The focus on hypothetical choices in the curriculum of Khemka et al. (2016), evolved into teaching how to act upon these choices during role plays in prototype 1, which proved complex for adolescents. Prototype 2 simplified the focus to two ways of resisting peers (i.e., walking away and saying no). However, adolescents still did not improve in their peer resistance. Potentially, teaching more divergent responses is more effective (Wright et al., 2004). Before developing a next prototype, the most effective for adolescents with mild-to-borderline intellectual disability to demonstrate peer resistance should be determined, potentially through interviews.

### 4.2.3 | Involvement of the environment

To further improve the content in terms of generalisation, the environment of the adolescent could be more actively involved during the

intervention (De Wit et al., 2011). For example, teachers could join one of the group lessons to connect learned peer resistance skills to daily classroom examples. Also, a friend of each participating adolescent could join an individual lesson to learn how to assist in a buddy role (see also Schwartz & Levin, 2022).

### 4.2.4 | Individualization

Building on the value of individual lessons in prototype 2, future versions of the intervention could enhance individualization. This may involve investigating individual profiles before the intervention considering strengths and weaknesses (e.g., language and communication difficulties).

### 4.2.5 | Improving assessment of peer resistance

Sensitive and ecologically valid assessment of peer resistance in adolescents with mild-to-borderline intellectual disability proved challenging. Based on opportunities and challenges we experienced using different measures (see Table 4), future research should develop measures that emphasise the generalisation of peer resistance to daily life such as diaries and shown peer resistant behaviour such as experimental tasks. For future diary measures, we learned that questions about concrete negative behaviours or occasions with peers improve adolescents' understanding of peer influence. As adults and adolescents had discrepant views on peer resistance, the diary could be elaborated with questions based on adolescents' views on peer influence situations. Other suggestions to improve diary measures could be having multiple prompts per day (and only let adolescents fill out questions when peer influence happened) or enabling responding via voice recording. Experimental tasks have the advantage of measuring peer resistance behaviour more objectively than self and other reports. However, the ecological validity of such tasks could be improved. Therefore, tasks like the DOSPERT-peer should be further developed to better capture the complexities of daily interpersonal social situations.

## 5 | CONCLUSIONS

We conclude that running a group peer resistance intervention for adolescents with mild-to-borderline intellectual disability at their practical vocational school is feasible in terms of recruitment, acceptability, and resources. Therefore, this study provided a valuable first step in creating an intervention to increase peer resistance. As adolescents with mild-to-borderline intellectual disability are a vulnerable group susceptible to negative peer influence and vocational schools are enthusiastic about implementing a peer resistance intervention, further development of the intervention is highly relevant.

## ACKNOWLEDGEMENTS

We would like to thank all adolescents, parents, and schools that participated. We are very grateful to Floor Bouhuijs, Bregtje van Elven, Floor Götschenberg, Kim Hart, Lorena Julio, Jesper Nicolai, Elcke Nijhuis, Marlou Roelen, Rosalie Rose, Lisa Sikkens, Zara Stenzler, Anna Tetenburg, Jesse Toepoel, Dylan Tromp, Anna de Voer, Jasper Vreken, Daniël Zijl, and Rowanne Zonneveld for their assistance in developing the intervention materials, providing the intervention, and the data collection.

## FUNDING INFORMATION

The authors received no financial support for the research, authorship, and/or publication of this article.

## CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

## DATA AVAILABILITY STATEMENT

As we collected privacy sensitive data in very small samples, we decided not to share the data publicly.

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## SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

**How to cite this article:** Wagemaker, E., Saleminck, E., Huizenga, H. M., Bart, H. F., Dekkers, T. J., & Bexkens, A. (2024). How to support peer resistance in adolescents with mild-to-borderline intellectual disability? Intervention development and feasibility. *Journal of Applied Research in Intellectual Disabilities*, 37(3), e13216. <https://doi.org/10.1111/jar.13216>