JIDR Journal of Intellectual Disability Research
Published on behalf of mencap and in association with IASSID

Journal of Intellectual Disability Research doi: 10.1111/jir.13136

VOLUME PART 2024

Impact of the emotional development approach on psychotropic medication in adults with intellectual and developmental disabilities: a retrospective clinical analysis

B. F. Barrett,[1] M. Wehmeyer,[2] J. Kolb,[1] T. Ostermann[3] & T. Sappok[4]

1 *Liebenau Kliniken, St. Lukas Klinik, Liebenau, Germany*
2 *Department of Pedagogy and Rehabilitation, Faculty of Psychology and Pedagogy, Ludwig Maximilians University, Munich, Germany*
3 *Department of Psychology and Psychotherapy, Faculty of Health, University of Witten/Herdecke, Witten, Germany*
4 *University Clinic for People with Neurodevelopmental Disorders, Mara, University Hospital OWL, Bielefeld University, Bielefeld, Germany*

Abstract

Background Compared with the general population, adults with an intellectual developmental disorder (IDD) are more likely to develop mental health problems and to receive high levels of psychotropic medication, particularly antipsychotics. The emotional development (ED) approach may help to better understand the nature of challenging behaviour (CB) and tailor treatment and support accordingly. The aim of this retrospective study was to investigate the impact of the ED approach on the prescription of psychotropic medication during inpatient psychiatric treatment.

Methods The clinical data of 1758 patients were analysed within a retrospective study design over a period of 12 years. ED level was assessed (1) for the first time (INITIAL-SEO), (2) during a previous hospital stay (PAST-SEO) or (3) not at all (NO-SEO). The effects of the ED assessment and the respective intervention during the current admission on the number of psychotropics and the number and dosage of antipsychotics were analysed for the total sample, including those with CB, autism spectrum disorders and psychosis. Group differences were analysed by a chi-square test and a one-factorial analysis of variance. For analysing the impact of the application of the ED approach on psychotropic medication, a covariance model was applied. Changes between the subsamples were analysed by *t*-tests for dependent samples.

Results The ED approach had a significant impact on reducing the overall amount of psychotropic medication and the dosage of antipsychotics in all patients with IDD. These effects were mainly attributable to those showing CB. In patients with autism spectrum disorders, the developmental approach reduced the number of antipsychotics. No effects could be observed in patients with psychosis; in this subsample, both the number and dosage of antipsychotics increased.

Conclusions The application of the ED approach in the current hospital stay reduced the number of psychotropic drugs and the number and dosage of antipsychotics, especially in those patients with IDD and CB, but also in those with autism spectrum disorders.

Correspondence: Dr Brian Fergus Barrett, Liebenau Kliniken, St. Lukas Klinik, Siggenweilerstr. 11, 88074 Meckenbeuren-Liebenau, Germany (e-mail: brian.barrett@stiftung-liebenau.de).

Keywords antipsychotics, challenging behaviour, diagnostic assessment, psychiatric disorder, psychosis, scale of emotional development

Introduction

Adults with an intellectual developmental disorder (IDD) are at risk of developing mental health problems. According to Hughes-McCormack *et al.* (2017), about one in four adults with IDD is affected by mental health problems. Findings from a recent meta-analysis (Mazza *et al.* 2020) indicate a pooled prevalence rate of 33.6% of psychiatric disorders (excluding autism) in adolescents and adults with IDD compared with 17% in the general population. A population-based study found a prevalence of 25% for challenging behaviour (CB) and 6% for schizophrenia or psychosis (Sheehan *et al.* 2015). The prevalence of autism spectrum disorders in IDD is estimated at 20–30%, compared with a much lower rate in the general population (Emerson & Baines 2008).

Challenging behaviour is defined as 'behaviour (…) of such an intensity, frequency or duration as to threaten the quality of life and/or the physical safety of the individual or others and is likely to lead to responses that are restrictive, aversive or result in exclusion' (Royal College of Psychiatrists 2007). Individuals with IDD, autism spectrum disorder, psychosis or CB pose high demands on caregivers due to increased self-harm or aggressive behaviours. Persons with IDD and/or autism spectrum disorder often receive high levels of psychotropic medication, particularly antipsychotics, often in the context of polypharmacy (de Kuijper *et al.* 2010; Deb *et al.* 2015; Deb, Roy, & Limbu 2022). Antipsychotics are prescribed not only for psychiatric disorders but often also for patients diagnosed with CB without appropriate indication (Sheehan *et al.* 2017; Perry *et al.* 2018). A recent meta-analysis (Song *et al.* 2023), which included data ranging from facility-specific samples to nationwide census data, showed an overall prevalence rate of psychotropic medication in adults with IDD of 41% (antipsychotics 31%, antidepressants 14%, anxiolytics 9%, hypnotics/sedatives 5% and psychostimulants 1%). In a multinational cross-sectional survey, Perry *et al.* (2018) found evidence of a significant level of 'off-label use' for psychotropic medication in patients without any psychiatric diagnosis. Given that the prescription of psychotropic medication has been found to be disproportionate to the presence of psychiatric disorders, several authors have criticised an overuse of psychotropics among people with IDD (Raghavan & Patel 2010; Tsiouris 2010; Deb *et al.* 2015; Sheehan *et al.* 2015).

There are several internal and external factors explaining or predicting the occurrence of CB in people with IDD; one of these factors refers to the emotional development (ED) approach (Došen 2005b). The ED approach is based on the development of socio-emotional brain functions during the maturation of social brain networks (Sappok *et al.* 2022). The formation of the respective neuronal networks is located within different parts of the limbic system. Hereby, high-order networks build on neuronal circuits that process more basic information. Disturbances in the formation of the brain networks during a certain developmental period may affect related functions. Acknowledging the trajectories of social brain development may result in a better understanding of behaviours in people with developmental delays (Sappok *et al.* 2022). Došen considers the level of ED a key component for the onset of CB in individuals with IDD. Accordingly, Sappok *et al.* (2014) showed strong associations between the level of ED and the severity of CB.

According to Došen, each level of ED is associated with certain developmental tasks and emotional needs: (1) symbiosis/adaptation; (2) attachment/socialisation; (3) autonomy/individuation; (4) social roles/identification; and (5) social contexts/realisation. Although ED and IDD are highly correlated, it is not possible to draw conclusions from the severity of IDD to the level of ED. In particular, discrepancies between cognitive and emotional developmental levels are found to be associated with CB (Böhm *et al.* 2019).

Došen (1989) developed a scheme for the assessment of ED level [Schaal voor Emotionele Ontwikkeling (SEO)] with 10 domains: (1) dealing with own body; (2) interaction with caregiver; (3) interaction with peers; (4) handling with material objects; (5) affect differentiation; (6) verbal communication; (7) anxiety; (8) object permanency; (9) experience of self; and (10) aggression regulation (Došen 2005a).

Various scales have been developed on the basis of SEO: *Scheme for Appraisal of Emotional Development* (SAED; Došen 2005a), *Scale for Emotional Development-Revised* (SED-R²; Morisse & Dosen 2017), *SEO-Lukas* (Barrett & Kolb 2011) and *Scale of Emotional Development – Short* (SED-S; Sappok *et al.* 2016). High correlations between different scales could be found (Sappok *et al.* 2023). So far, only the diagnostic validity has been evaluated, especially for the SED-S. However, the effect of applying the ED approach on psychotropic medication has not yet been examined.

A broad range of non-pharmacological and pharmacological interventions are recommended for the treatment of CBs, with small effect sizes for these (Groves *et al.* 2023). Several initiatives encourage clinicians to review and discontinue psychopharmacotherapy for CBs (de Kuijper & Hoekstra 2018; Deb *et al.* 2020; Deb, Limbu, *et al.* 2022). Meanwhile, more detailed information from the patients themselves, the clinicians and quantitative assessments are available for drug withdrawal trials to support and guide the process (de Kuijper & Hoekstra 2018; Deb *et al.* 2020; de Kuijper *et al.* 2022). Non-pharmacological approaches in the treatment of adults with IDD and CB that focus on environmental factors like staff skills show mixed outcomes. While Positive Behaviour Support (PBS) has been shown to decrease CB by McGill *et al.* (2018), Strydom *et al.* (2020) found no clinical effectiveness of PBS in adults with IDD and comorbid autism spectrum disorder. Hassiotis *et al.* (2018) could not find effects of the PBS on CBs in a randomised controlled trial. Similarly, a systemic training programme for clinical staff failed to produce significant effects on aggressive behaviour or psychotropic medication (Nagy *et al.* 2019). The implementation of a training course to reinforce staff empathy resulted in a small positive but non-significant outcome (Hastings *et al.* 2018). Mindfulness training has been found to reduce the use of physical restraints and medication for CB (Singh *et al.* 2016) and was superior to PBS (Singh *et al.* 2020).

The aim of this retrospective clinical study was to investigate the effect of the application of the ED approach (assessment and intervention) on the usage of psychotropic medication in all patients with IDD admitted to a psychiatric hospital over a period of 12 years:

1 Does the application of the ED approach affect the number of psychotropics or the number or dosage of antipsychotics?
2 Are there distinct differences in certain subgroups, specifically in persons with CB, autism spectrum disorders or psychosis?

Methods

Study setting and design

This retrospective clinical study was conducted in the adult psychiatry department of a hospital specialised in the treatment and care of people with an IDD in Germany. All patients admitted to the hospital between January 2005 and December 2016 were included in the study. The inclusion criteria were age ≥ 18 years and a diagnosis of IDD of any degree. In total, $N = 1758$ patients were included. All information about psychiatric diagnoses, ED assessment and psychopharmacology (number of different psychotropic medications and dosage of antipsychotics) was drawn from the hospital's database.

As part of routine clinical care, all patients received a thorough diagnostic assessment, including a physical examination, a standardised psychiatric assessment and a structured behavioural analysis. Standardised assessment instruments (e.g. for the diagnosis of autism spectrum disorder, dementia and attention deficit hyperactivity disorder) were applied by trained psychologists when necessary. In 479 patients, the level of ED was assessed using the SEO-Lukas (cf. details below). The indication for the assessment of ED level was determined by the attending physician if the symptomatology could not be fully explained by a psychiatric disorder or a somatic disease. The final clinical diagnoses relied on ICD-10 criteria (Dilling *et al.* 2004, 2015). Psychiatric treatment included pharmacological, psychological and behavioural measures primarily based on a behavioural therapy approach. In addition, counselling was offered for family members and outpatient service providers.

Emotional development level was assessed (1) for the first time (INITIAL-SEO), (2) during a previous hospital stay (PAST-SEO) or (3) not at all (NO-SEO). When available (1 and 2), the ED results (SEO level 1, 2, 3, 4 or 5) were recorded, and the treatment

and support plan were aligned accordingly [*Conditions According to SEO* (CAS-Lukas); Barrett & Kolb 2013]. When ED level was assessed, the developmental approach was followed by individually adapting settings and demands to the patients' emotional needs. This did not lead to any scheduled therapy sessions but meant adapting the environment to the patients' needs on a 24/7 basis. This was done according to the semi-standardised recommendations available for each level of ED (CAS-Lukas; Barrett & Kolb 2013). The entire care team was instructed on how to adapt treatment and support according to the patient's needs based on the level of ED. Adaptation measures involved structural and procedural changes to the environment as well as optimising the way in which caregivers interact, communicate and regulate stress with the patient. The process was continuously supervised by a clinical psychologist. Before discharge, the recommendations were reflected in the outpatient care system. The principles of the ED approach have not been substantially changed over time.

Assessment instrument

Emotional development was measured using the SEO-Lukas (Barrett & Kolb 2011). The scale refers to five levels of ED: (1) symbiosis; (2) attachment; (3) first autonomy; (4) supervised peer group interaction; and (5) supported self-reliance. Scores are rated within 10 domains: (1) relating to own body; (2) relating to significant others; (3) interaction; (4) object permanence; (5) anxiety; (6) relating to peers; (7) relating to objects; (8) communication; (9) differentiating emotions; and (10) regulating aggression. The scale comprises 200 items: four items in each of five levels within 10 domains. Each item describes concrete behaviour patterns to be scored, whether observable or not. An expert in developmental psychology conducted semi-structured interviews with the multidisciplinary team on the basis of clinical observations over a period of at least 14 days, and SEO items were scored accordingly. The identified stages for each domain depended on the number of scores agreed. The results lead to an SEO profile across all domains.

Data analysis

Data were collected retrospectively from the hospital's database. Demographic data pertaining to sex, age, degree of IDD and comorbid psychiatric diagnoses were included. The amount of psychotropic medication was evaluated at admission (T1) and discharge (T2) according to (1) the number of different psychotropics, (2) the number of antipsychotics and (3) the antipsychotic dosage. To compare the exposure to different antipsychotics with specific dosages, the respective antipsychotic dosage was calculated in terms of haloperidol equivalents (Andreasen *et al.* 2010; Benkert & Hippius 2013).

Socio-demographic and diagnostic data of the overall sample and the SEO subsamples were analysed descriptively and, depending on the scale level, presented as percentages (gender, diagnostic group and degree of IDD) or mean values with standard deviations as well as median and range (age). As this is a non-randomised design, the group differences for these data were also determined using the chi-square test for nominal data or the one-factorial analysis of variance for metric data.

For the analysis of the target variables 'number of psychotropics', 'number of antipsychotics' and 'antipsychotic dosage', a covariance model was applied to the data, in which values at discharge were defined as the dependent variable and the diagnosis subgroups as a fixed factor. Due to the assumed strong differences in the target variables at admission, the admission value was integrated into the model as a covariate. In addition to the descriptive values, the between-group difference compared with the NO-SEO group was also estimated for the target variables by Bonferroni adjustment from the model. In addition to the *P*-value, partial eta-squared was calculated as the effect size and converted into Cohen's *d* using the formula given in Lenhard & Lenhard (2022). The changes within the respective groups were also analysed using a *t*-test for dependent samples and the corresponding Cohen's effect size and integrated into the corresponding graphical representations. Statistical analyses were considered significant when the *P*-value was below the level of significance of $\alpha = 0.05$. All statistical analyses were carried out using SPSS Version 29.

Ethical statement

The study only used data from the hospital's existing database. Written informed consent to the psychiatric treatment and evaluation (whether by patient or by legal representative) was part of routine patient care. The study was approved by the ethical committee of the hospital. The data were used and stored anonymously, in accordance with the applicable data privacy law [§13 Landesdatenschutzgesetz Baden-Württemberg (LSDG 2018)].

Study sample

The total database included 1758 patients, of whom 57.8% were male and 42.2% were female. The mean age was 38.7 years (*SD* 13.8). The degree of IDD ranged from mild (44.8%) to moderate (42.9%) and severe/profound (12.3%). The average duration of stay at the hospital was 46.0 days (*SD* 29.5; *Mdn* 42.0; range 1–348).

Mental health problems were differentiated as follows: CB n = 709 (40.3%), autism spectrum disorders n = 396 (22.5%) and psychosis (ICD-10: F2x.x and F06.2) n = 389 (22.1%). Other diagnoses (e.g. depression, anxiety disorders and trauma) were extracted in n = 264 patients (15.0%).

Two different groups received the ED assessment: (1) during a previous hospital stay (PAST-SEO) and (2) during the current hospital stay for the first time (INITIAL-SEO). In a third group, the level of ED was not assessed (NO-SEO).

An SEO assessment was applied for n = 479 patients (27.2%): n = 379 (21.6%) for the first time (INITIAL-SEO) and n = 100 (5.7%) during previous admissions (PAST-SEO). In n = 1279 patients (72.8%), ED was not assessed (NO-SEO). The allocation to a group did not depend on the time of admission to the hospital (2005–2016). Within the two subsamples, INITIAL-SEO and PAST-SEO, patients were scored as SEO-1 (13.6%), SEO-2 (25.3%), SEO-3 (37.8%), SEO-4 (15.4%) or SEO-5 (7.9%).

Table 1 provides an overview of the socio-demographic and diagnostic data of the sample for each SEO subsample. While the sex distribution showed no differences between the SEO groups, there are significant differences in the age distribution as well as in the degree of IDD and the diagnostic

Table 1 Comparison of socio-demographic and diagnostic data subdivided by SEO subsamples

	NO-SEO ***N* = 1279**	**INITIAL-SEO** ***N* = 379**	**PAST-SEO** ***N* = 100**	**Total** ***N* = 1758**	***P*-value**
Age					
Mean ± SD	39.91 ± 14.11	35.56 ± 12.82	35.05 ± 10.14	38.70 ± 13.79	<0.001
Median	39.00	32.00	34.00	37.00	
Range (min; max)	18; 90	18; 77	19; 63	18; 90	
Gender					
Male	531 (41.5%)	167 (44.1%)	44 (44.0%)	742 (42.2%)	0.632
Female	748 (58.5%)	212 (55.9%)	56 (56.0%)	1016 (57.8%)	
Diagnostic subgroups					
Autism spectrum disorder	284 (22.6%)	83 (21.9%)	29 (29.0%)	396 (22.5%)	<0.001
Psychosis	271 (21.2%)	94 (24.8%)	24 (24.0%)	389 (22.1%)	
Challenging behaviour	504 (39.4%)	179 (47.2%)	26 (26.0%)	709 (40.3%)	
Other	220 (17.2%)	23 (6.1%)	21 (21.0%)	264 (15.0%)	
Degree of IDD					
Mild	600 (46.9%)	138 (36.4%)	49 (49.0%)	787 (44.8%)	<0.001
Moderate	548 (42.8%)	170 (44.9%)	36 (36.0%)	754 (42.9%)	
Severe/profound	131 (10.2%)	71 (18.7%)	15 (15.0%)	217 (12.3%)	

Between-group differences were analysed using univariate analysis of variance for metric data and the chi-square test for nominal data. INITIAL-SEO, assessment of the level of emotional development (ED) for the first time; PAST-SEO, assessment of ED during a previous hospital stay; NO-SEO, level of ED was not assessed; IDD, intellectual developmental disorder.

subgroups ($P < 0.001$). Those with younger ages, those with CBs and those with more severe forms of IDD more often received ED assessments.

Results

Table 2 provides a comparison of psychotropic medication data between the three SEO subsamples from admission to discharge. In particular, differences were found for the comparison of NO-SEO and INITIAL-SEO in the overall sample and in those with CB, which showed medium effects with effect sizes of eta-square 0.025, 0.031 and 0.07 (Cohen's *d* between 0.32 and 0.55). The data show a considerable reduction of medication in the INITIAL-SEO subsample compared with the NO-SEO or PAST-SEO subsamples in patients with CB or autism spectrum disorder, but not in the case of psychosis. No between-group differences were found when comparing the NO-SEO with the PAST-SEO group.

Figures 1–4 show the number of psychotropics, the number of antipsychotics and the dosage of antipsychotics at admission and discharge for the different subgroups of CB, autism spectrum disorder and psychosis in those with an INITIAL-SEO assessment. Differences for all three target parameters can be observed in the total sample (Fig. 1) and in patients with CB (Fig. 2). For those with autism spectrum disorders, the number of antipsychotics reduced significantly between admission and discharge (Fig. 3). In the psychosis group, both the number and dosage of antipsychotics increased from admission to discharge (Fig. 4).

Discussion

People with IDD and mental health problems are at risk for high dosages of psychotropic medication, especially those with severe CB (Sheehan *et al.* 2017; Perry *et al.* 2018). This retrospective analysis of a clinical sample of adults with IDD indicates a reduction in the number of psychotropic medications and antipsychotic dosages after application of the ED approach, particularly in those showing CB. The strong effects of the developmental approach in this subgroup may explain the effects in the overall sample. The level of ED and the associated socio-emotional competencies support the decision for or against a certain therapeutic approach (Sappok *et al.* 2022). The results of the current study indicate that the assessment of the level of ED is especially useful in the case of CB, and the corresponding intervention may help reduce pharmacotherapy in this subgroup. The application of the ED approach reduced the number of antipsychotics in patients with autism spectrum disorder in those who received the ED assessment for the first time. Thus, patients with autism spectrum disorder may also profit from the application of the ED approach in terms of a reduction in antipsychotics. In patients with psychosis, antipsychotic pharmacotherapy increased, regardless of whether ED was assessed or not. In this sample, antipsychotic pharmacotherapy remained – in accordance with the current guidelines – the primary choice of therapy.

Previous findings have shown that low levels of ED are strongly associated with CB (Sappok *et al.* 2014) and that each level of ED is associated not only with specific socio-emotional needs but also with different behavioural phenomena that should be carefully distinguished from psychopathological symptoms (Hermann *et al.* 2022). However, the MEMENTA study (Schützwohl *et al.* 2016) indicated that individuals' special needs with regard to minor or major mental health problems are still not being sufficiently met, and the use of psychotropic medication remains the most common strategy in managing behavioural problems. Similarly, results from the SPECTROM study (Deb, Limbu, *et al.* 2022) shed light on the pivotal role of staff's perceptions and attitudes towards the use of medication to manage CB. The study showed that caregivers' practice of requesting psychotropic medication is often due to insufficient knowledge about both psychiatric disorders and the use of alternative strategies to manage behaviours that challenge; caregivers may instead search for a 'quick fix' (Tsiouris 2010). Ethical reflection of contexts is needed when psychotropic medication is used as a chemical restraint due to a lack of appropriate educational or therapeutic interventions. International guidelines clearly recommend non-pharmacological psychosocial interventions before considering psychotropic medication when mental health is affected or CB occurs (Deb, Perera, *et al.* 2022).

The results of the current study add a non-pharmacological alternative, the ED approach, to

Table 2 Comparison of psychotropic medication data between the three SEO subsamples from admission to discharge

	NO-SEO		INITIAL-SEO		PAST-SEO			Between-group differences (Cohen's effect size; 95% CI)	*P*-value; partial η^2	Between-group differences (Cohen's effect size; 95% CI)	*P*-value; partial η^2
	Admission	Discharge	Admission	Discharge	Admission	Discharge	NO-SEO–INITIAL-SEO	NO-SEO–PAST-SEO			
Total sample	*n* = 1279		*n* = 379		*n* = 100						
Number of psychotropics	2.35 ± 1.28	2.29 ± 1.19	2.20 ± 1.40	2.02 ± 1.17	2.69 ± 1.16	2.61 ± 1.08	0.18 (0.08|0.28)	<0.001; 0.007	−0.11 (−0.30|0.07)	0.23; 0.001	
Number of antipsychotics	0.95 ± 0.64	1.01 ± 0.61	0.98 ± 0.68	0.91 ± 0.68	1.02 ± 0.59	1.01 ± 0.46	0.12 (0.06|0.18)	<0.001; 0.008	0.04 (−0.06|0.14)	0.40; 0.001	
Antipsychotic dosage	5.62 ± 6.71	5.91 ± 6.65	4.90 ± 5.97	4.13 ± 3.83	5.37 ± 3.51	5.71 ± 3.10	1.28 (0.82|1.74)	<0.001; 0.017	0.01 (−0.82|0.84)	0.98; <0.001	
Subgroup challenging behaviour											
Number of psychotropics	2.25 ± 1.35	2.22 ± 1.29	2.28 ± 1.51	1.89 ± 1.24	2.58 ± 1.39	2.38 ± 1.17	0.34 (0.20|0.49)	<0.001; 0.031	0.06 (−0.28|0.40)	0.73; <0.001	
Number of antipsychotics	0.85 ± 0.61	0.94 ± 0.53	0.95 ± 0.73	0.79 ± 0.84	0.96 ± 0.82	0.96 ± 0.60	0.21 (0.11|0.30)	<0.001; 0.025	0.04 (−0.14|0.23)	0.66; <0.001	
Antipsychotic dosage	4.84 ± 6.88	5.12 ± 6.91	5.57 ± 7.36	3.19 ± 3.97	5.47 ± 4.77	5.51 ± 3.52	2.43 (1.76|3.10)	<0.001; 0.070	0.11 (−1.48|1.70)	0.89; 0.001	
Subgroup ASD											
Number of psychotropics	2.45 ± 1.23	2.34 ± 1.16	2.17 ± 1.37	2.07 ± 1.06	2.34 ± 1.32	2.17 ± 1.14	0.12 (−0.11|0.34)	0.323; 0.003	0.11 (−0.26|0.48)	0.57; 0.001	
Number of antipsychotics	1.05 ± 0.63	1.10 ± 0.56	1.00 ± 0.64	0.84 ± 0.51	0.83 ± 0.54	0.90 ± 0.49	0.24 (0.12|0.35)	<0.001; 0.042	0.10 (−0.90|0.28)	0.30; 0.003	
Antipsychotic dosage	6.51 ± 6.93	7.20 ± 7.20	4.93 ± 5.09	4.03 ± 3.43	4.17 ± 3.11	4.96 ± 3.38	2.00 (0.91|3.09)	<0.001; 0.034	0.40 (−1.34|2.14)	0.65; 0.001	
Subgroup psychosis											
Number of psychotropics	2.50 ± 1.18	2.44 ± 1.09	2.04 ± 1.23	2.14 ± 1.13	2.83 ± 0.96	2.96 ± 1.10	0.08 (−0.15|0.31)	0.481; 0.001	−0.37 (−0.77|0.03)	0.07; 0.011	
Number of antipsychotics	1.18 ± 0.63	1.28 ± 0.59	0.96 ± 0.65	1.21 ± 0.41	1.33 ± 0.48	1.21 ± 0.41	−0.03 (−0.15|0.09)	0.623; 0.001	0.14 (−0.07|0.35)	0.20; 0.006	
Antipsychotic dosage	7.78 ± 6.97	8.17 ± 6.30	3.78 ± 3.73	6.06 ± 3.42	6.24 ± 3.16	6.80 ± 2.81	−0.43 (−1.43|0.57)	0.396; 0.002	0.39 (−1.42|2.19)	0.67; 0.001	

Between-group differences were analysed using a longitudinal analysis of covariance model in which the admission measurement is included as a covariate in the linear model. INITIAL-SEO, assessment of the level of emotional development (ED) for the first time; PAST-SEO, assessment of ED during a previous hospital stay; NO-SEO, level of ED was not assessed; CI, confidence interval; ASD, autism spectrum disorder.

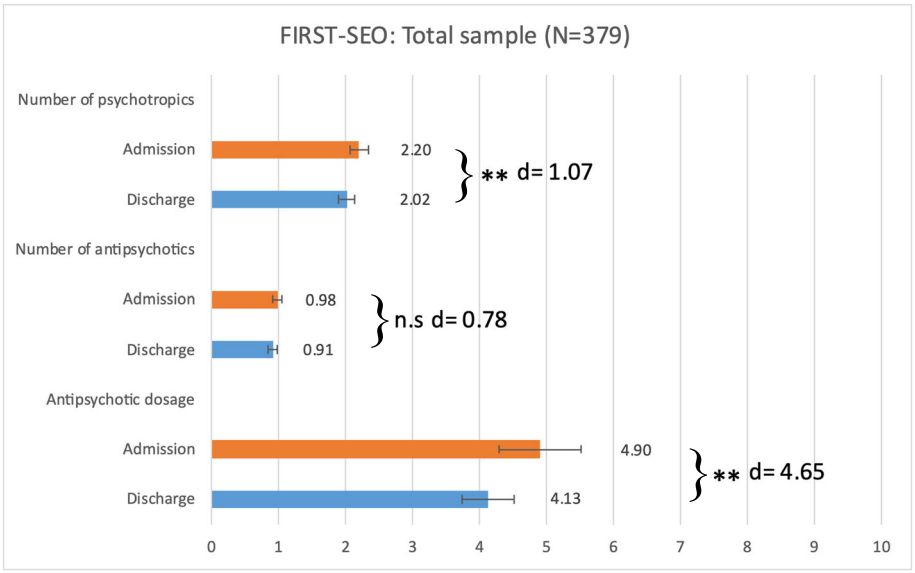

Figure 1. Changes of medication after application of the emotional development approach (INITIAL-SEO) in the total sample (N = 379). INITIAL-SEO, assessment of the level of emotional development for the first time. * denotes significant differences ($P < 0.05$), while ** denotes highly significant differences ($P < 0.01$).

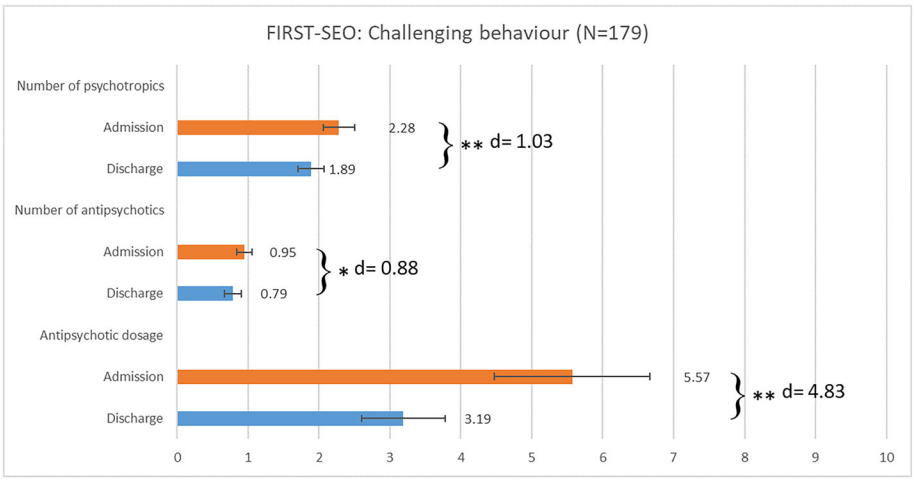

Figure 2. Changes of medication after application of the emotional development approach (INITIAL-SEO) in the challenging behaviour subgroup (n = 179). INITIAL-SEO, assessment of the level of emotional development for the first time. * denotes significant differences ($P < 0.05$), while ** denotes highly significant differences ($P < 0.01$).

provide appropriate treatment and support to this highly vulnerable group, in particular individuals with IDD exhibiting CB. The current study did not assess the effects of the ED approach on CB, and the concrete variables of the ED approach that may have led to the decrease in medication in the CB and autism spectrum disorder subgroups are not clear yet. However, other interventions also consider developmental aspects, such as mentalisation-based therapy, which requires theory of mind abilities, while individuals with lower levels of ED may respond to attachment-based behavioural therapy (Sterkenburg

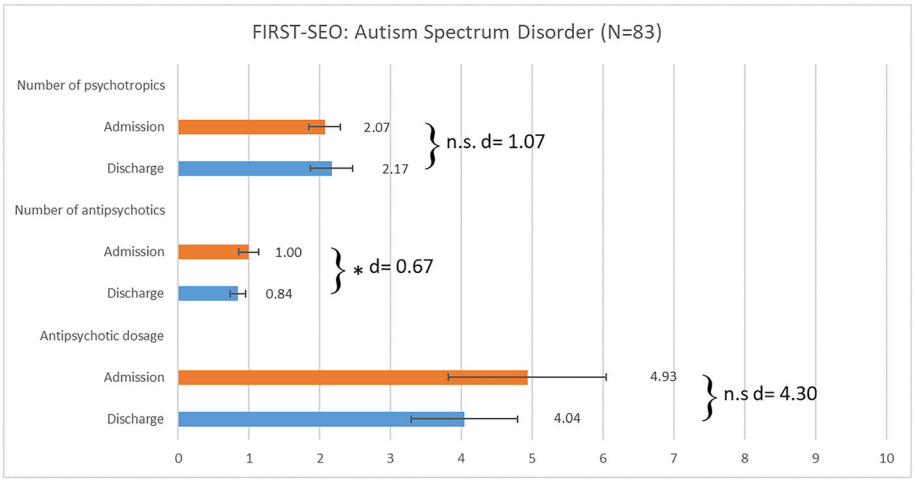

Figure 3. Changes of medication after application of the emotional development approach (INITIAL-SEO) in the autism spectrum disorder subgroup (n = 83). INITIAL-SEO, assessment of the level of emotional development for the first time. * denotes significant differences ($P < 0.05$), while ** denotes highly significant differences ($P < 0.01$).

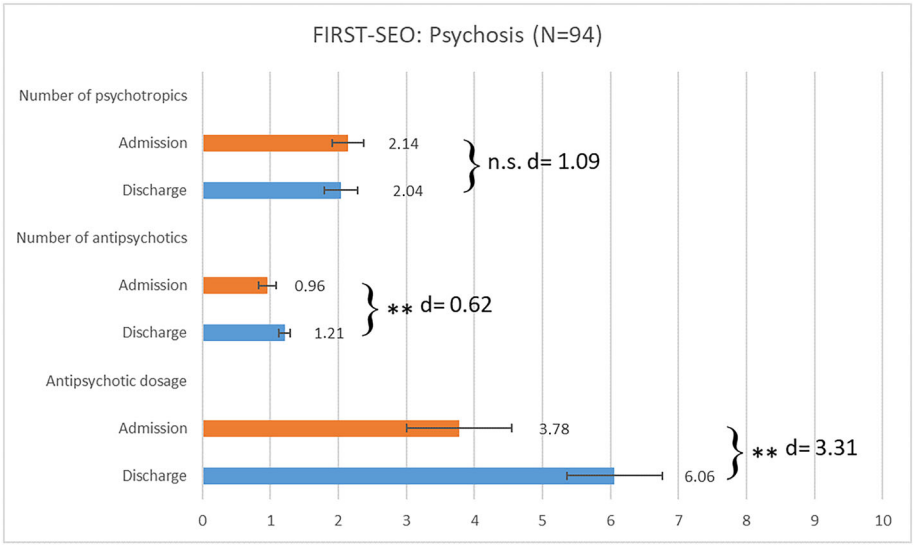

Figure 4. Changes of medication after application of the emotional development approach (INITIAL-SEO) in the psychosis subgroup (n = 94). INITIAL-SEO, assessment of the level of emotional development for the first time. * denotes significant differences ($P < 0.05$), while ** denotes highly significant differences ($P < 0.01$).

et al. 2008; Dekker & Sterkenburg 2014). Targeting personalised treatments in line with the individual's needs and abilities is pivotal for persons with developmental disabilities, as a wide range of mental, communicative and interactive abilities may occur. Knowledge of the level of ED may support the staff in attuning to the emotional needs of the patient and, therefore, reducing stress and maybe the associated CB. Further research is needed to test the hypothesis of reduced CB after the application of the ED approach.

Regarding the chosen statistical approach, an analysis of covariance (ANCOVA) model outperforms non-parametric tests such as the

Mann–Whitney *U*-test 'for most distributions under most circumstances' (Vickers 2005). Thus, our approach using an ANCOVA model seems to be justified and superior to the analysis of change scores or median differences. In addition, the ANCOVA approach provides clinicians with important information about the size and relevance of the statistical effect by indicating the 95% confidence interval and the effect size partial eta-square, which can be easily transformed into Cohen's *d*. And even if the ANCOVA is primarily recommended for randomised studies to adjust baseline differences (Van Breukelen 2006), the statistical analyses of Senn (2006) were able to show that in many cases, the ANCOVA delivered effect sizes of the same order of magnitude as a repeated measures model. Moreover, our baseline difference is in the range of 0.2 standard deviations, and thus, according to Walter *et al.* (2011), an ANCOVA approach is appropriate. And although our analyses can be considered sufficiently robust, ANCOVA models with an underlying Poisson distribution, as described in Al-Eid & Shoukri (2021), would be a possible alternative for future analyses.

Strengths and limitations

The study deals with a topic of great clinical relevance by investigating the impact of a non-pharmacological therapeutic concept, the ED approach, on psychotropic medication. The retrospective analysis was based on a large sample size of 1758 subjects with IDD and addressed relevant mental disorders in this population. The conversion of different dosages into haloperidol equivalents facilitated the comparison of different antipsychotic substances. The findings indicate that an ED-related intervention based on the assessment of the level of ED is associated with less antipsychotic medication in persons with IDD and CB, or autism spectrum disorder. However, the effects on the severity of CB, mental health or quality of life have not been assessed. Furthermore, in those suffering from psychosis, the dosage of antipsychotics even increased. However, the retrospective study design does not allow distinct conclusions on a causal relationship between the ED approach and the psychotropic drug prescription. It cannot be ruled out that other treatment measures (e.g. functional therapies) may also have contributed to the reduction in medication, as the data set did not contain any corresponding information. A prospective study design may be chosen in further research projects to clearly assess the effect sizes in treatment versus non-treatment groups.

The study was conducted in the inpatient unit of only one psychiatric clinic specialising in treating patients with IDD. Thus, the descriptive data, especially with respect to diagnoses and amounts of medication, cannot be generalised beyond the psychiatric context. On account of the retrospective design (neither randomised nor matched control groups), bias due to systematic differences in the subpopulations cannot be ruled out. No conclusion can be drawn with regard to the sustainability of the ED approach either: the average duration of the inpatient stay (46 days) was too short to investigate lasting behavioural changes, and there was a lack of follow-up data. Further studies should investigate the long-term impact of the ED approach, including the effects of cooperation between inpatient and outpatient stakeholders.

Conclusions

The ED approach may complement the assessment and treatment of individuals with IDD and CB, as the current study indicates options for reducing antipsychotic medication in this subgroup. The application of the developmental approach in day-to-day care and support systems may also be supportive for persons with IDD and autism spectrum disorders, as in this subgroup, a reduction in antipsychotics could be observed after the SEO assessment for the first time during the hospital stay. Further research in a prospective, randomised study design is needed to analyse the effects of this pilot study.

A strong European alliance of practitioners and scientists (Network of Europeans on Emotional Development) has been constituted to advance standardised, scientifically validated concepts based on the developmental approach. The ED approach may aid practitioners in providing high-quality care and support to a highly vulnerable population.

Acknowledgements

We thank the entire team at St. Lukas Klinik, Liebenau, Germany.

Open Access funding enabled and organized by Projekt DEAL.

Source of funding

No external funding was received for the research reported in the paper.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as potential conflicts of interest.

Data availability statement

Research data are not shared.

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Accepted 1 March 2024