Dialectical behavior therapy-skills system for cognitively challenged individuals with self-harm: a Swedish pilot study

Alexandra Rosendahl-Santillo[1*†], Reid Lantto[1*†], Lena Nylander[1,2*†], Christina Thylander[1*†], Pernilla Schultz[1*†], Julie Brown[3], Märta Wallinius[4,5,6] and Sofie Westling[1*†]

[1]Department of Clinical Sciences Lund, Psychiatry, Lund University, Lund, Sweden;[2]Gillberg Neuropsychiatry Centre, Psychiatry and Neurochemistry, Institute of Neuroscience and Physiology, Sahlgrenska Academy, University of Gothenburg, Gothenburg, Sweden; [3]Simmons University, Boston, Massachusetts, USA; [4]Lund Clinical Research on Externalizing and Developmental Psychopathology, Child and Adolescent Psychiatry, Department of Clinical Sciences Lund, Lund University, Lund, Sweden; [5]Centre for Ethics, Law and Mental health, The section of Psychiatry and Neurochemistry, Institute of Neuroscience and Physiology, Sahlgrenska Academy, University of Gothenburg, Gothenburg, Sweden; [6]Research Department, Regional Forensic Psychiatric Clinic, Växjö, Sweden

Background: Dialectical behavior therapy (DBT) is an evidence-based treatment for self-harm and emotion regulation difficulties. A modified version, DBT-Skills System (DBT-SS), has been developed in the USA for individuals with cognitive difficulties. The present study is a pilot study, testing the DBT-SS in a Swedish context.

Methods: Six participants were treated with individual therapy and group skills training for 48 sessions each. A case series design was used to follow individual development over time. The primary outcome measure was reduction in challenging behaviors. Secondary outcomes were level of functioning in daily life, hospital admissions, and resilience and vulnerabilities in different risk domains. Data was analyzed using time-series diagrams. Effect sizes of changes were calculated using Cohen's d.

Results: Challenging behaviors decreased over time and participants' global level of functioning increased. There was a reduction in number of hospital admissions over time. As for resilience and vulnerabilities, participants' overall level of risk in various areas remained unchanged or decreased after treatment.

Conclusions: The results indicate that DBT-SS might be a promising treatment for cognitively challenged individuals with emotion regulation difficulties and challenging behaviors in a Swedish context. The study provides suggestions for a future randomized controlled trial.

Supplemental data for this article is available online at here.

Keywords: dialectic behavior therapy Skills System, cognitive difficulties, intellectual disability, borderline intellectual functioning, emotion dysregulation, self-harm, challenging behavior, psychotherapy

Introduction

Individuals with cognitive challenges (here defined as intellectual disability or borderline intellectual functioning) have difficulties understanding, processing, and generalizing new knowledge (American Psychiatric Association 2013). They show an increased vulnerability to other psychiatric conditions, such as depression (Reiss and Rojahn 2008), mood swings (Tyrer *et al.* 2006, Barnicot *et al.* 2012), personality disorders and post-traumatic stress disorder (Peña-Salazar *et al.* 2018), but also to high levels of frustration (Tyrer *et al.* 2006). Challenging behaviors such as aggression, destructive behavior and self-harm are found in 10–20% of all individuals with intellectual disability (Davies and Oliver 2013). Studies of individuals with borderline intellectual functioning, usually defined as having an IQ in the range of 71–84 (Peña-Salazar *et al.* 2018), indicate that emotional-behavioral difficulties

Correspondence to: Alexandra Rosendahl-Santillo, DBT-teamet, Division Psykiatri, 22185 Lund, Sweden. Email: alexandra.rosendahl-santillo@skane.se; Reid Lantto, Forskningsavdelningen, Psykiatri, 22185 Lund, Sweden. Email: reid.lantto@skane.se

*Office of Psychiatry and Habilitation, Psychiatric Clinic Lund, Lund, Sweden.

†Office for Psychiatry and Habilitation, Psychiatry Research Skåne, Lund, Sweden.

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are more common in this population as compared to individuals without cognitive challenges (King *et al.* 2019). Furthermore, there are some indications, although inconclusive, of a higher prevalence of self-harm and suicidal behavior in this population (Hassiotis *et al.* 2011).

Dialectical behavior therapy (DBT) is a treatment developed for individuals with borderline personality disorder (BPD; Linehan 1993). Individuals with BPD have a high prevalence of self-injurious as well as suicidal behaviors (90% and 75% respectively; Goodman *et al.* 2017). A number of studies have shown beneficial effects of DBT, such as reduced self-harm and psychiatric symptoms, reduced duration of hospitalization and increased global level of functioning (Linehan *et al.* 2006, van den Bosch *et al.* 2002, Verheul *et al.* 2003, Cristea *et al.* 2017, Storebø *et al.* 2020). DBT has also proven to be effective in treating other psychiatric disorders where difficulties in managing emotions and problem behaviors are a part of the symptomatology, such as substance abuse (Linehan *et al.* 2002, Linehan *et al.* 1999) and eating disorders (Safer *et al.* 2001). Today, DBT is one of the first choices of treatment for individuals with Borderline Personality Disorder without cognitive challenges (National Institute for Health and Care Excellence 2009, American Psychiatric Association 2001).

There is less evidence for specific forms of psychotherapeutic treatment concerning cognitively challenged individuals (National Institute for Health and Care Excellence 2016, Beail 2015), even though programs have been carried out in order to adapt DBT for people with intellectual disabilities (Lew *et al.* 2006, Sakdalan *et al.* 2010). These studies have used the core skills of the DBT manual and adapted the materials, and the results indicate that the model is modifiable to suit this group of individuals and can have an effect on challenging behaviors also in this population (Brown 2016). Small preliminary studies are promising (McNair *et al.* 2017), but more knowledge on this subject is needed and treatment effect in randomized clinical trials remains to be investigated.

Dialectical Behavior Therapy Skills System (DBT-SS) is a manual-based psychotherapeutic method developed for treatment of individuals with emotional difficulties and challenging behaviors who have cognitive challenges (Brown 2016). In DBT-SS, the skills have been simplified and renamed in a more concrete language; 300 skills have been regrouped into nine, still reflecting all the core modules of standard DBT (mindfulness, emotional regulation, distress tolerance and interpersonal effectiveness) (Linehan 1993). In addition to the standard components of DBT (Brown 2016), DBT-SS is complemented by providing training in the method for a companion chosen by the individual receiving treatment, i.e. residential staff, a family member, or friend. Companions are included in the treatment to provide reminders and support when necessary. As in standard DBT, phone support for the individual and a consultation team for the therapist is available (Brown 2016). A longitudinal pilot study of DBT Skills System (Brown *et al.* 2013) followed 40 individuals with developmental disabilities (most with intellectual disability) and challenging behaviors. Challenging behaviors were reduced, but not until after approximately 12–48 months. Milder behavior problems, such as swearing, making threats and reckless management of property, were reduced earlier in treatment than were more dangerous behaviors (Brown *et al.* 2013).

Handouts for DBT-SS, available in the treatment manual (Brown 2016), have been translated into Swedish (Brown 2017), but the method has not yet been evaluated in a Swedish context. The present study is a case series pilot study aiming to explore possible outcome measures for a larger, randomized controlled trial evaluating the DBT-SS in a Swedish setting. The following research questions were addressed by single case time-series analysis:

Primary research question

1. May treatment with DBT-SS reduce the frequency of challenging behaviors, including self-harm, for cognitively challenged individuals?

Secondary research questions

1. May treatment with DBT-SS reduce the usage of inpatient psychiatric services for cognitively challenged individuals?
2. May treatment with DBT-SS affect the level of functioning of cognitively challenged individuals?
3. May treatment with DBT-SS affect level of risk, resilience, and vulnerability for cognitively challenged individuals?

Materials and methods

Study design

The present study tested the feasibility and effects of the DBT-SS in a Swedish context, through a case series pilot study on six referred individuals meeting inclusion criteria; 1) current contact with the adult psychiatric services, 2) IQ 60–85, 3) 18–65 years of age, 4) current self-harm behavior with at least two occasions of self-harm in the past 6 months, 5) a companion of the participant's choice was willing and able to take part in the treatment process, and 6) residing in the uptake area of the study. Exclusion criteria were active diagnoses of: 1) psychotic disorder or bipolar disorder type 1, 2) substance dependence, and 3) non-psychiatric condition contributing significantly to the symptomatology. One individual previously meeting all criteria was excluded from the study after initial assessment but before consent, due to moving out of the uptake area. Data was

collected over at least 62 weeks prospectively and 48 weeks retrospectively. The study was performed to prepare for a possible randomized clinical trial and to detect and overcome potential obstacles in the execution and evaluation of the DBT-SS in a Swedish context.

Trial registration

The study was retrospectively registered 2018-08-13 on https://clinicaltrials.gov with the trial registration number NCT03627663.

Ethics approval and consent to participate

This study was approved by the regional ethical review board at Lund University (Reg. No. 2017/827).

We deemed it probable that several of the included individuals would have a lawfully appointed fiduciary, implying that they per definition are considered to have reduced ability to care for their own interests. However, very few studies exist today that examine treatments for individuals with impaired cognitive functioning, why it is ethically indefensible to avoid doing clinical research targeting this group. We therefore considered the current study important, since these individuals are overrepresented in studies of mental health issues (King *et al.* 2019). (Hassiotis *et al.* 2011).

Two versions of written information were provided to the participants, to ensure understanding of the study. One of the forms was detailed and contained all the specific information of relevance for the study. The individual could go back to this, read it and discuss it at several occasions with their companion. The second form was much shortened and adapted to what an individual with cognitive challenges may be able to assimilate upon receiving the information for the first time. Substantial importance was also placed on verbal information adapted for the individuals, where the individual got the opportunity to ask questions until they were satisfied with the answers. The accompanying person also received both forms, along with verbal information, and got the opportunity to ask questions and have these answered. Furthermore, the manager for the residential care home signed an agreement for the staff to be offered training and to set aside time for answering questions, in accordance with the method. The joint assessment of the research team was that this was the most ethically appropriate procedure.

Setting

The DBT team involved in this study is part of adult psychiatric services in southern Sweden. The team is responsible for offering treatment to individuals above the age of 18 who are diagnosed with Borderline personality disorder. Clinicians at the clinic were informed about the study and asked to refer potential participants to the DBT team. Referred individuals were consecutively informed of the study and asked for consent to participate.

The intervention

The first phase in DBT-SS is the orientation phase, with weekly sessions during weeks 2–10 where participants learned the basic structure of the treatment. These were not considered treatment sessions. Next, the participant and their therapist signed a treatment contract and the DBT-SS intervention started. The intervention phase included two sessions a week: one with group skills training and one individual session. The sessions were provided for 45 min/week over 12 months.

Treatment fidelity and adherence

Four experienced DBT therapists, clinically active in the DBT team, worked in the project as individual therapists and skills trainers. The therapists had received training and certification by dr. Julie Brown, originator of the DBT-SS, who provided regular consultation during the course of the study. The therapists also received continual consultation by an external DBT therapist. All treatment sessions (individual and group sessions) were recorded on video and the videos were available for therapist consultation.

Participants

Participant 1 was a 35-year-old woman with Borderline personality disorder, ADHD (attention deficit hyperactivity disorder) and Anoxic brain injury. Participant 1 had severe self-harm behaviors with multiple self-harm and suicide attempts since adolescence and had been in psychiatric care for most of her adult life. The participant was assessed to have an IQ of 61–72.

Participant 2 was a 33-year-old man with Intellectual developmental disorder and Obsessive-compulsive disorder. Participant 2 had had active self-harm behaviors and contact with specialist psychiatry throughout his adult life, with frequent admissions. He had multiple previous suicide attempts. The participant was assessed to have an IQ of 63–74.

Participant 3 was a 52-year-old woman with Intellectual developmental disorder with significant behavioral impairment and Borderline personality disorder. Participant 3 had a long history of self-harm behavior, substance abuse and aggressive behaviors, as well as multiple attempted suicides. The participant was assessed to have an IQ of 58–69.

Participant 4 was a 26-year-old woman with Intellectual developmental disorder with significant behavioral disorder and high suicidality. Participant 4 had a long history of significant behavioral disorders with self-harm behaviors, externalizing behaviors, and suicide attempts. At the time of the study, she had current contact with the specialist psychiatry and had been

frequently admitted for psychiatric inpatient care. The participant was assessed to have an IQ of 58–69.

Participant 5 was a 19-year-old woman with Mixed anxiety and depression state and Borderline personality disorder with active self-harm behavior. She had a recurrent and severe suicidal behavior. The participant was assessed to have an IQ of 67–78.

Participant 6 was a 37-year-old man with Borderline personality disorder, ADHD and Substance dependence in remission. Participant 6 had had active self-harm behaviors and contact with specialist psychiatry throughout adulthood, with numerous suicide attempts and frequent visits at the psychiatric emergency department. The participant was assessed to have an IQ of 75–86.

Assessments

The World Health Organization's Disability Assessment Schedule 2.0 (WHODAS 2.0; Almborg *et al.* 2015) is a 36-item questionnaire assessing functioning in six domains: *cognition* (understanding and communicating), *mobility* (moving and getting around), *self-care* (hygiene, dressing, eating and staying alone), *getting along* (interacting with others), *life activities* (domestic responsibilities, leisure, work, and school), and *participation* (joining in community activities). Higher scores on this measure reflect a lower level of functioning. In the current study, we used the interview-administered version of the WHODAS 2.0 for interviews with the individuals.

The Behavior Registration Form (BRF; Nylander 2019) was used as a measure of challenging behaviors. The BRF is organized by color; red color denotes dangerous, out of control behaviors, such as self-harm or threatened violence toward others, which cannot be diverted by trained staff. Orange indicates that the individual is feeling upset and frustrated, displaying challenging behaviors that require staff assistance with affect regulation but do not pose a danger to themselves or others. Yellow indicates that the individual is apprehensive, concerned or anxious but manages to self-regulate and does not display any challenging behaviors. Green denotes neutral or positive affect with no behavioral problems. Blue color denotes sleep. In the BRF, special remarks are made for the most significant types of problem behaviors (self-harm, violence toward others, threats of violence, unauthorized absence, creating conflict), as well as an 'other' category where other types of problem behaviors may be specified. Registrations are made on an hourly basis by someone close to the individual or by residential staff. The completed BRF was given to the DBT therapist on a weekly basis. The BRF is included as supplementary material to this article, see Appendix 1 .

The Short-Term Assessment of Risk and Treatability (START; Webster *et al.* 2004). The START is a structured professional assessment guideline assessing factors of resilience and vulnerability in individuals with mental illness. It is a measure originally designed for use among forensic populations, but the areas covered include common problem areas for the participants in the present study. The START comprises 20 items and assessments are performed for eight risk domains (risk to others, suicide, self-harm, self-neglect, substance abuse, unauthorized leave, victimization).

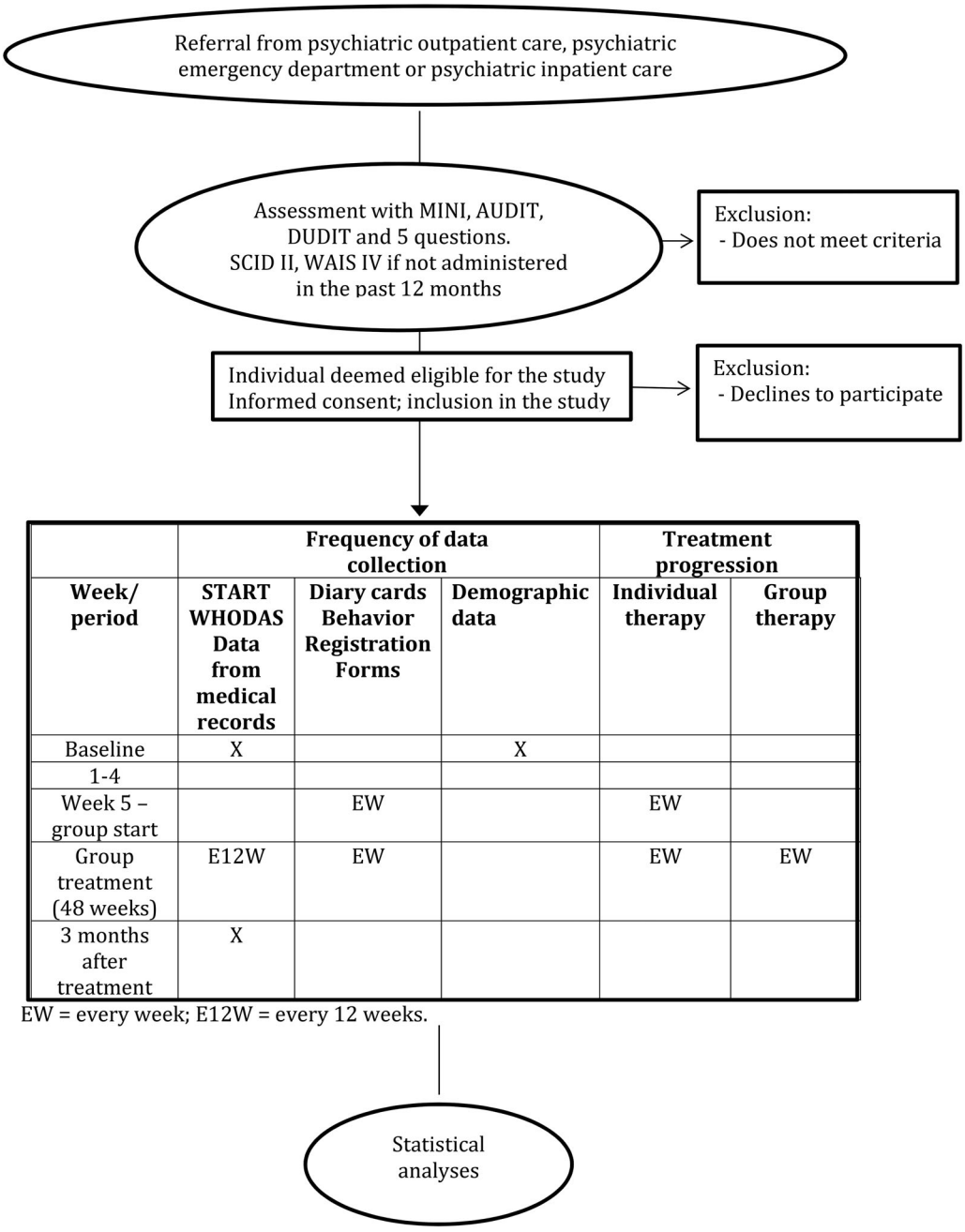
Diary cards. The diary cards are part of the worksheets used in the first pilot on DBT-SS (Brown 2017). They function as the participants' individualized logs of challenging behaviors. On the diary cards, the participants register their personal target behaviors, regarded as treatment goals (e.g. reducing self-harm, reducing conflict). Participants also note their ability to use alternative behaviors. The diary cards contain five evaluative questions about participants' views of ability to learn, ability to understand and use the method as well as ability to manage difficult and strong emotions. The questions are rated on a five-point scale using smileys.

Procedure

Data collection

Data was collected for this study between 2017 and 2020. All individuals referred to DBT undergo a structured diagnostic assessment including the *MINI-International Neuropsychiatric Interview* (Sheehan *et al.* 1998), the *Structured Clinical interview for DSM-IV AXIS II Disorders* (First *et al.* 1997), *Five questions* (Holmqvist and Nylander 2013), the *Montgomery-Asberg Depression Rating Scale – self-rating* (Eriksson 2011), the *Alcohol Use Disorders Identification Test* (Bergman and Källmén 2002, Babor *et al.* 2001) and the *Drug Use Disorders Identification Test (*Berman *et al.* 2005, Hildebrand 2015) as clinical routine. If the interviews or other information indicate cognitive challenges, the individual is offered additional cognitive testing with the *Wechsler Adult Intelligence Scale IV* (Weiss *et al.* 2010, Wechsler 2008). Based on these assessments, individuals fulfilling inclusion criteria were offered participation in the current study, and those who wished to participate provided informed consent. Upon inclusion, demographic variables were collected, such as age, gender, level of education, housing situation, current occupation, etc.

The START and WHODAS 2.0 were administered six times in total by a clinician interviewing the participants (author CT). The BRF and the diary cards were collected weekly from the companions and the individuals, respectively. The participants' medical records were accessed to retrieve information on the number of medications taken on a regular basis or *pro re nata*, as well as the number of visits to the emergency psychiatric department, days spent in psychiatric hospital in regular voluntary care, days admitted to compulsory psychiatric care and the number of coercive measures used, as well as the number of days spent in psychiatric hospital on



	Frequency of data collection			Treatment progression	
Week/ period	**START WHODAS Data from medical records**	**Diary cards Behavior Registration Forms**	**Demographic data**	**Individual therapy**	**Group therapy**
Baseline	X		X		
1-4					
Week 5 – group start		EW		EW	
Group treatment (48 weeks)	E12W	EW		EW	EW
3 months after treatment	X				

EW = every week; E12W = every 12 weeks.

Figure 1. Study procedure.

Brief Admissions (BA, a patient-controlled form of admission to hospital promoting autonomy; Westling *et al.* 2019). For a detailed overview of the procedure of recruitment and data collection, see Figure 1.

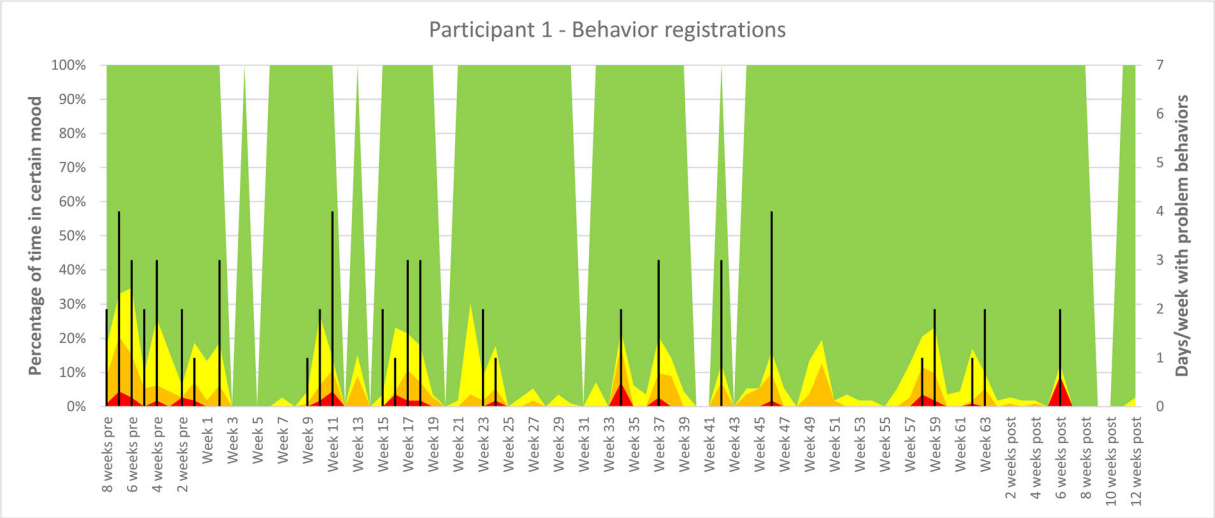
Statistical analyses

Visual inspection of changes in data over time has previously been used in research applying case series designs on small samples (Knutsson *et al.* 2017). In the current study, data on challenging behaviors collected on a weekly basis was plotted in graphs, enabling a detailed overview of the development over time for each participant regarding the primary outcome.

Effect sizes of changes over time were calculated using Cohen's d (Cohen 1988, Manolov and Solanas 2008). Cohen's d was calculated for all outcomes, primary as well as secondary.

For the weekly behavior registrations, means and standard deviations were calculated for separate time periods, i.e. pre-treatment, for the duration of each treatment module and post-treatment. Cohen's d was then calculated comparing these time periods to obtain information about gradual changes over time, as well as comparing pre-treatment with post-treatment. The same procedure was used for the data on admissions, registered biweekly during treatment as well as for about 24 weeks before and after treatment.

Data on hospitalization and from the WHODAS 2.0 and the START were collected at discrete time points. In these cases, means and standard deviations were



Red: not responsive to support; orange: in need of support; yellow: worried but coping; green: okay; black: dangerous problem behaviors

Figure 2. Behavior registrations for Participant 1.

calculated for pre-treatment, post-treatment and follow-up. Cohen's d was calculated investigating change between these time points.

Results

Primary outcome

The primary outcome of the study was the frequency of challenging behaviors, including self-harm behaviors. Self-harm behaviors were recorded in the BRF and grouped together with other dangerous behaviors, i.e. threat of self-harm as well as violence or threatened violence toward others. Five out of six participants (all but Participant 2) had close relatives or staff who continually submitted these forms. These data are illustrated in Figures 2–6 below.

A general trend, observable in Figures 2–6, was that participants tended to be in the BRF red zone more often before treatment and in the beginning of the treatment, exhibiting dangerous problem behaviors or tantrums relatively often. Over time, these challenging behaviors decreased, as seen in how the distances between the black lines gradually grow larger. A clear trend was that dangerous problem behaviors occurred much less frequently during the last module of the treatment (intervention weeks 51–63) and after completion of the treatment.

For participant 5, dangerous problem behaviors appeared to stop altogether after completion of the first module (intervention weeks 1–13). For participants 3 and 4, these behaviors ceased during module two (intervention weeks 23–34), with the latter exhibiting a single day of dangerous self-harm behavior eight weeks after the end of treatment. Participant 6 demonstrated one week with several days of dangerous problem behaviors during module three (intervention weeks 35–50), but no further such behaviors thereafter. Even participant 1, who exhibited more frequent dangerous problem behaviors than the other participants during the whole study period, demonstrated improvement over time, with more weeks passing between dangerous problem behaviors toward the end of treatment and after completion of the treatment. Interestingly, participants 1, 3 and 6 appeared to be in the orange BRF zone, i.e. in need of support, just as much toward the end of the treatment as they were in the beginning of the treatment. However, this did not escalate into dangerous problem behaviors as frequently in the second half of treatment as in the first.

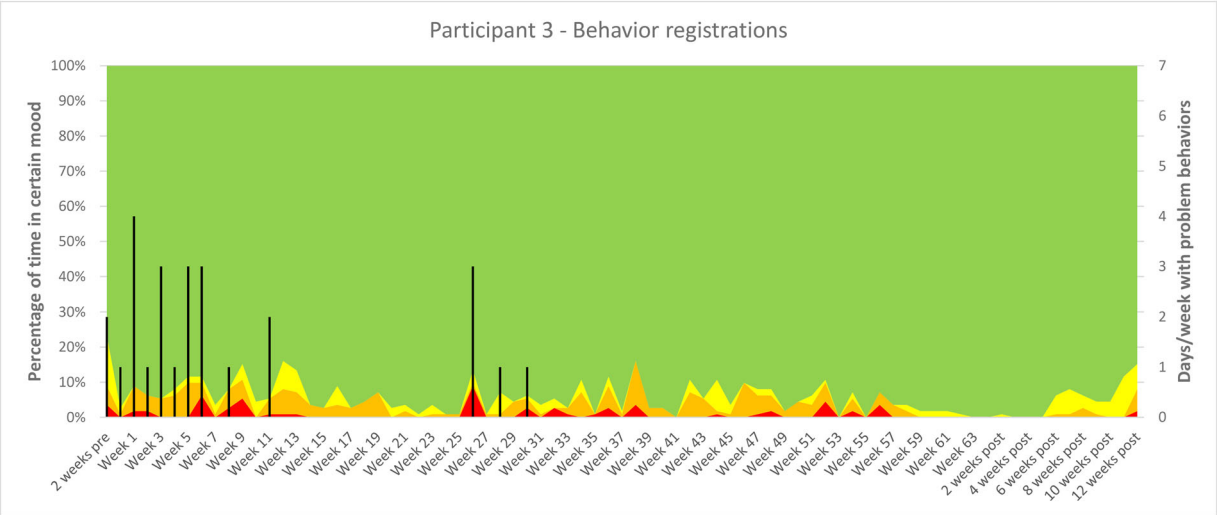
The mean hours per week coded as red for each participant before, during and after treatment, as well as effect sizes of changes, are shown in Table 1. These data also indicate general improvements over time for the participants. A large, positive effect was seen from pre- to post-intervention for participants 3 and 6 and a small such effect for participant 1, with hours in the red BRF zone decreasing after treatment. For participant 4, a small *negative* effect was observed, with hours in the red zone increasing somewhat over time. Participant 5 had no record of ever being in the red zone. A notable finding was that hours in the BRF red zone tended to increase after treatment as compared to during the last module of the treatment. This was true for three out of the four participants who had records exhibiting change in this variable over time.

Secondary outcomes

Admissions

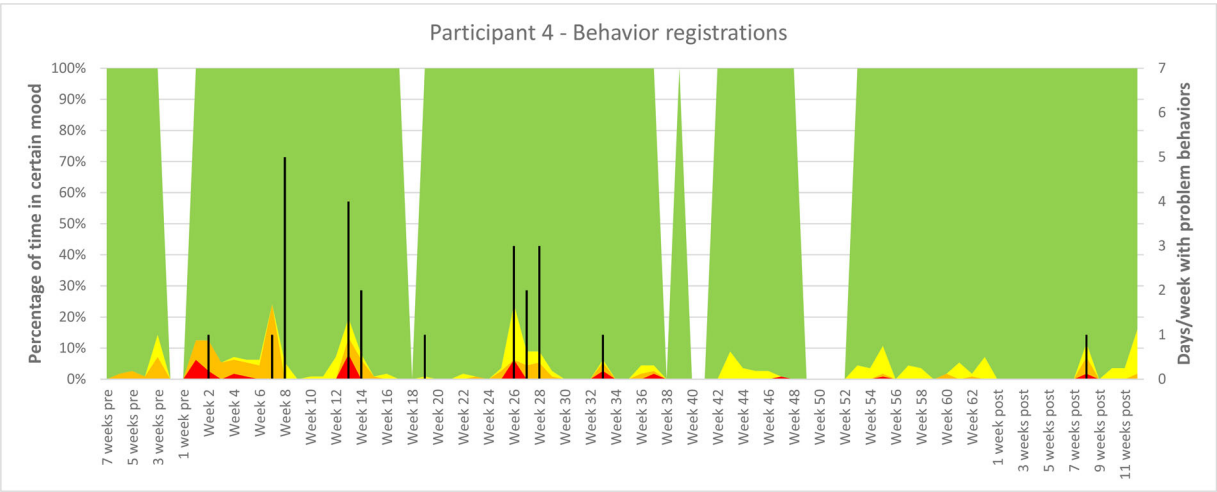
Data on the number of times the participants were in contact with the emergency psychiatric department are displayed in Table 2. Table 3 displays data on the number of regular, physician-approved admissions.

Regarding visits to the emergency psychiatric department, the findings indicate a general improvement, i.e. a reduction in visits, among the participants over time.



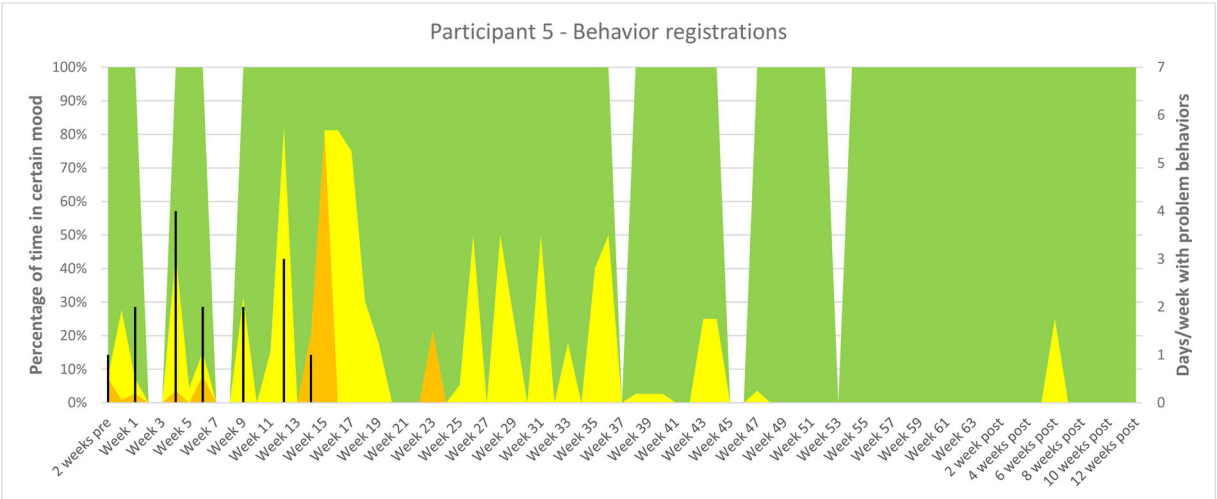
Red: not responsive to support; orange: in need of support; yellow: worried but coping; green: okay; black: dangerous problem behaviors

Figure 3. Behavior registrations for Participant 3.



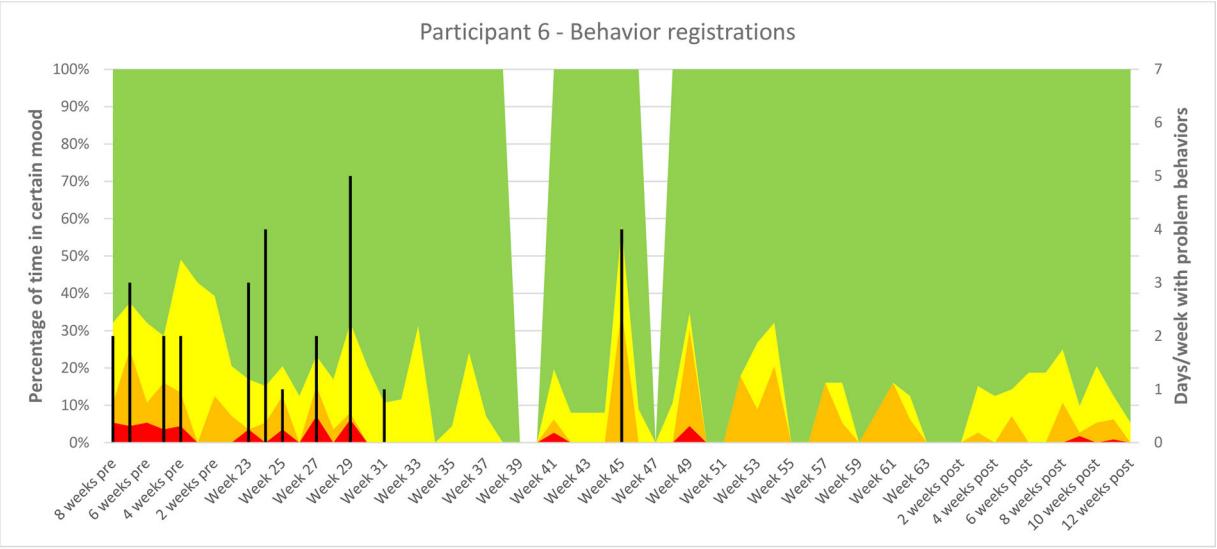
Red: not responsive to support; orange: in need of support; yellow: worried but coping; green: okay; black: dangerous problem behaviors

Figure 4. Behavior registrations for Participant 4.



Red: not responsive to support; orange: in need of support; yellow: worried but coping; green: okay; black: dangerous problem behaviors

Figure 5. Behavior registrations for Participant 5.



Red: not responsive to support; orange: in need of support; yellow: worried but coping; green: okay; black: dangerous problem behaviors

Figure 6. Behavior registrations for Participant 6.

Table 1. Behavior registrations.

	Behavior registrations: Hours per week coded as 'red' Mean ± standard deviation *Cohen's d**					
	Pre-intervention	**Module 1**	**Module 2**	**Module 3**	**Module 4**	**Post-intervention****
P1	2.00 ± 1.58 *0.83*	0.70 ± 1.55 *−0.11*	0.91 ± 2.31 *0.30*	0.38 ± 0.92 *−0.15*	0.54 ± 1.15 *−0.20*	1.00 ± 3.00 *0.42*
P2	–	–	–	–	–	–
P3	2.00 ± 2.00 *0.11*	1.77 ± 2.22 *0.14*	1.42 ± 2.81 *0.31*	0.75 ± 1.20 *−0.07*	0.85 ± 1.66 *0.55*	0.17 ± 0.55 *1.25*
P4	0 *−0.83*	1.69 ± 2.87 *0.35*	0.83 ± 2.03 *0.37*	0.27 ± 0.62 *0.37*	0.09 ± 0.29 *−0.18*	0.17 ± 0.55 *−0.43*
P5	0 *N/A*	0 *N/A*	0 *N/A*	0 *N/A*	0 *N/A*	0 *N/A*
P6 ***	3.25 ± 2.76 *0.47*	– –	1.92 ± 2.90 *0.55*	0.62 ± 1.62 *0.54*	0 *−0.59*	0.25 ± 0.60 *0.80*

*Effect sizes are reported between the current module and the next, such that the d reported under Module 1 denotes the effect size between Module 1 and Module 2.
**The d reported under Post-intervention denotes the effect size between pre- and post-intervention.
***For Participant 6, who started the intervention at Module 2, the d reported under the Pre-intervention column denotes the effect size between pre-intervention and Module 2.
N/A means Not applicable. Dashes indicate no data was retrieved.

Table 2. Visits to psychiatric emergency care.

	Visits to emergency care: Number of visits per two-week period Mean ± standard deviation *Cohen's d**					
	Pre-intervention	**Module 1**	**Module 2**	**Module 3**	**Module 4**	**Post-intervention****
P1	0.92 ± 0.79 *0.62*	0.43 ± 0.79 *0.14*	0.33 ± 0.52 *0.03*	0.31 ± 0.82 *−0.03*	0.33 ± 0.52 *−0.50*	0.67 ± 0.78 *0.32*
P2	0.42 ± 0.67 *0.91*	0 *N/A*	0 *−0.87*	0.38 ± 0.52 *0.87*	0 *N/A*	0 *0.91*
P3	0.33 ± 0.49 *0.43*	0.14 ± 0.38 *−0.06*	0.17 ± 0.41 *−0.19*	0.25 ± 0.46 *0.19*	0.17 ± 0.41 *0*	0.17 ± 0.39 *0.38*
P4	0.33 ± 0.46 *−0.28*	0.57 ± 1.13 *−0.11*	0.67 ± 0.52 *1.22*	0.13 ± 0.35 *−0.11*	0.17 ± 0.41 *−0.37*	0.33 ± 0.49 *0*
P5	0 *−0.53*	0.14 ± 0.38 *0.52*	0 *N/A*	0 *N/A*	0 *N/A*	0 *N/A*
P6 ***	1.50 ± 0.80 *0.86*	– –	0.83 ± 0.75 *0.80*	0.25 ± 0.71 *0.14*	0.17 ± 0.41 *0.58*	0 *2.66*

*Effect sizes are reported between the current module and the next, such that the d reported under Module 1 denotes the effect size between Module 1 and Module 2.
**The d reported under Post-intervention denotes the effect size between pre- and post-intervention.
***For Participant 6, who started the intervention at Module 2, the d reported under the Pre-intervention column denotes the effect size between pre-intervention and Module 2.
N/A means Not applicable. Dashes indicate no data was retrieved.

Table 3. Regular physician-approved psychiatric hospital admissions.

	Regular hospital admissions (voluntary & compulsory): Days per two-week period Mean ± standard deviation *Cohen's d**					
	Pre-intervention	Module 1	Module 2	Module 3	Module 4	Post-intervention**
P1	9.17 ± 4.04	10.00 ± 5.00	12.17 ± 2.99	7.75 ± 5.63	11.17 ± 4.92	2.58 ± 3.55
	−0.18	*−0.53*	*0.98*	*−0.65*	*2.00*	*1.73*
P2	4.67 ± 8.15	0.43 ± 1.13	2.67 ± 5.61	3.25 ± 5.20	0	0
	0.73	*−0.55*	*−0.11*	*0.88*	*N/A*	*0.81*
P3	1.50 ± 3.40	0.14 ± 0.38	0.17 ± 0.41	0.50 ± 0.93	0.17 ± 0.41	0.17 ± 0.39
	0.56	*−0.06*	*−0.47*	*0.47*	*0*	*0.55*
P4	0.75 ± 1.36	1.57 ± 3.05	2.50 ± 2.59	0.13 ± 0.35	0.33 ± 0.82	0.42 ± 0.51
	−0.35	*−0.33*	*1.29*	*−0.33*	*−0.12*	*0.32*
P5	0	0.14 ± 0.38	0	0	0	0
	−0.53	*0.53*	*N/A*	*N/A*	*N/A*	*N/A*
P6	2.75 ± 2.01	–	1.33 ± 1.21	1.00 ± 2.14	0.33 ± 0.82	0
***	*0.83*	–	*0.19*	*0.41*	*0.58*	*1.94*

*Effect sizes are reported between the current module and the next, such that the d reported under Module 1 denotes the effect size between Module 1 and Module 2.

**The d reported under Post-intervention denotes the effect size between pre- and post-intervention.

***For Participant 6, who started the intervention at Module 2, the d reported under the Pre-intervention column denotes the effect size between pre-intervention and Module 2.

N/A means not applicable. Dashes indicate no data was retrieved.

A large, positive effect was seen between pre- and post-treatment for two participants, a small such effect for two other participants, while no change was observed for the remaining two participants. In no case, participants visited the emergency psychiatric department more often post-treatment as compared to pre-treatment.

Improvement was also noted regarding the number of days of regular psychiatric hospital admissions in the form of an overall reduction over time. When comparing post-treatment to pre-treatment, a large, positive effect was seen for three participants while small to medium such effects were seen for two participants. For one participant, no change in number of days of regular psychiatric hospital admissions was observed. No deterioration (i.e. increased number of days of regular psychiatric hospital admissions) was observed for any participant over time.

Regarding compulsory psychiatric care, only two participants were affected. Participant 2 was admitted to compulsory care for a few days during treatment module 3 but not during any other module or in the 24-week period before or after treatment. Participant 1 had some instances of compulsory care admissions during the study period, yet with a small, positive effect between pre- and post-treatment, meaning there was a decrease after treatment as compared to before.

Regarding self-admissions using BA, only two participants made use of this during the study period. Participant 1 used BA after, but not before or during, treatment. Participant 6 used BA in the last treatment module and after treatment.

Level of daily functioning

For four participants, their level of daily functioning, as measured by the WHODAS 2.0, increased between pre- and post-treatment as evidenced in decreased mean scores (see Table 4). The effect sizes varied from small to large. As for the other two participants, one participant showed a negligible decrease in level of function, and the other shows a medium, negative effect, indicating deterioration of daily functioning.

At follow-up, one participant demonstrated a small deterioration as compared to post-treatment, however, the WHODAS scores still demonstrated an improvement as compared to the pre-treatment scores. Three participants demonstrated continued improvements in WHODAS scores at follow-up. When comparing follow-up to pre-treatment, the WHODAS scores show three small, positive effects, two large, positive effects and one medium, negative effect. These results also include subscales that are not considered relevant for treatment.

Regarding level of functioning as measured by specific subscales, there was a general improvement in the Getting along subscale from pre- to post-treatment, with five out of six participants showing decreased scores, one with a medium effect and the other four showing large effects. At follow-up, two participants demonstrated continued improvements in this area. Only one participant showed a deterioration between pre- and post-treatment, yet with improvement at follow-up, back to the same level of functioning as pre-treatment. From pre-treatment to follow-up, there was a large, positive effect for four participants, a medium, positive effect for one participant, and no detectable change for one participant.

Regarding the Cognition subscale, four participants improved their level of functioning in this area from pre- to post-treatment, with three large effect sizes and one medium. The other two participants displayed no change on this subscale. At follow-up, three out of six participants showed small to medium improvements

Table 4. WHODAS total averages and relevant subscale averages.

	WHODAS Mean ± standard deviation *Cohen's d**		
	Pre-intervention	Post-intervention	Follow-up
P1			
Tot_{AV}	2.50 ± 1.19	2.16 ± 1.06	1.94 ± 1.19
	0.30	*0.20*	*0.47*
Cog	3.50 ± 0.55	2.00 ± 0.89	2.17 ± 1.17
	2.02	*−0.16*	*1.46*
GA	3.40 ± 0.89	1.80 ± 0.84	1.20 ± 0.45
	1.85	*0.89*	*3.11*
P2			
Tot_{AV}	3.63 ± 1.36	2.89 ± 1.48	3.18 ± 1.25
	0.52	*−0.23*	*0.34*
Cog	4.50 ± 0.55	3.67 ± 1.63	3.17 ± 1.17
	0.68	*0.35*	*1.46*
GA	3.60 ± 0.89	2.80 ± 1.10	3.60 ± 0.89
	0.80	*−0.80*	*0*
P3			
Tot_{AV}	3.58 ± 1.88	2.53 ± 1.16	2.29 ± 1.03
	0.67	*0.22*	*0.85*
Cog	4.33 ± 1.63	2.50 ± 1.22	2.67 ± 0.82
	1.27	*−0.16*	*1.29*
GA	4.00 ± 1.73	2.80 ± 0.84	2.80 ± 0.45
	0.88	*0*	*0.95*
P4			
Tot_{AV}	1.84 ± 0.97	2.29 ± 0.96	2.34 ± 0.91
	−0.46	*−0.06*	*−0.53*
Cog	2.67 ± 0.52	2.67 ± 1.03	2.67 ± 1.03
	0	*0*	*0*
GA	2.60 ± 1.34	2.00 ± 0.71	2.00 ± 0.71
	0.56	*0*	*0.56*
P5			
Tot_{AV}	3.31 ± 1.45	1.61 ± 0.89	1.50 ± 0.86
	1.42	*0.12*	*1.52*
Cog	4.17 ± 0.98	2.00 ± 1.26	1.33 ± 0.52
	1.91	*0.69*	*3.61*
GA	3.60 ± 0.89	2.40 ± 1.52	2.40 ± 1.52
	0.96	*0*	*0.96*
P6			
Tot_{AV}	2.25 ± 1.11	2.28 ± 1.31	1.88 ± 1.10
	−0.03	*0.34*	*0.34*
Cog	2.17 ± 0.41	2.17 ± 0.75	1.83 ± 0.75
	0	*0.44*	*0.55*
GA	2.20 ± 0.45	3.40 ± 1.14	1.20 ± 0.45
	−1.39	*2.54*	*2.24*

Tot_{AV} = Total average; Cog = Cognition; GA = Getting along.
*Cohen's d reported under one column denotes the effect between that time point and the next; the d reported under Follow-up denotes the effect between pre-intervention and follow-up.

between post-treatment and follow-up, whereas two participants marginally deteriorated and one showed no change. From pre-treatment to follow-up, five participants had improved, out of which four had large improvements and the fifth a medium-sized improvement. The remaining participant's Cognition score was unchanged.

All other WHODAS subscales have been subjected to individual analyses as well; see Supplementary Tables 1–2 in Appendix 2 for an overview of all results.

Resilience and vulnerabilities in different risk domains

Resilience and vulnerabilities in seven different risk domains (risk to others, suicide, self-harm, self-neglect, substance abuse, unauthorized leave, victimization) were assessed using the START. With one exception, participants level of risk in the domains either remained unchanged or decreased after treatment. Supplementary figures are provided, illustrating changes over time in key and critical factors for each participant (see Supplementary Figures 1–6 in Appendix 3).

Discussion

This study was a case series pilot study aimed to explore how the DBT-SS, developed and tested for an American population with emotion regulation difficulties, behavior problems and cognitive difficulties (Brown *et al.* 2013), would work in a Swedish context. The study evaluated the feasibility of implementing the treatment model in Swedish psychiatric healthcare, and primarily examined whether the method might reduce challenging behaviors. The results suggest that DBT-SS is a feasible and promising method to target challenging behaviors among Swedish individuals with cognitive challenges.

The main findings of this study were that participants showed a reduction in dangerous problem behaviors including self-harm, suicide attempts and suicidal communication. These results are in line with previously demonstrated large reductions in challenging behaviors, including self-harm, in the original pilot study on DBT-SS (Brown *et al.* 2013) and from evaluations of other versions of adapted DBT among cognitively challenged individuals (Sakdalan *et al.* 2010, McNair *et al.* 2017). These findings are highly clinically relevant, as challenging behaviors such as self-harm are among the main treatment targets of standard DBT (Linehan *et al.* 2006).

Another finding was that participants in the current study in general experienced increases in overall level of daily functioning, and particularly so in areas relating to interpersonal functioning and problem-solving. These areas are specifically targeted in the DBT-SS treatment model (Brown 2016). Interestingly, level of functioning is rarely assessed as an outcome in treatment evaluation for cognitively challenged individuals, with one exception being a pilot study on DBT skills training for a forensic population with intellectual disabilities (Sakdalan *et al.* 2010). In this study, as well, participants' global functioning was observed to increase. The current study demonstrates that assessments of level of functioning is relevant in treatment evaluation for cognitively challenged individuals with emotion regulation difficulties and challenging behaviors, and that this can be done with the commonly used WHODAS measure.

A number of measures were used for data collection in this study. The authors note the particular usefulness of the Behavior Registration Forms to collect data on problem behaviors, and the WHODAS 2.0 to assess participants' level of functioning. Regarding the former, the authors found information on the *intervals between*

dangerous problem behaviors to be more telling than the frequency of problem behaviors exhibited at a certain time point. Arguably, self-harm behaviors and challenging behaviors are complex and contextual, and individuals might have moments of temporary vulnerability and setback. These could be affected by numerous factors impossible to control for, such as changes in their accommodation, behavior of other residents, or contact with relatives. Looking at the intervals between challenging behaviors, the outcome analysis becomes less sensitive to such factors. Longer periods free of dangerous problem behaviors (as exhibited by all five participants with behavior registrations collected for this study) could indicate that the individuals have accumulated more adaptive coping skills. Furthermore, logging intervals free from problem behaviors circumvents the difficulty in classifying the frequency of problem behaviors. For instance, would ten superficial wrist cuts within 15 min be classified as ten acts of self-harm, or as one single episode? As BRF is completed by different companions for every participant, logging intervals free from problem behaviors seems more reliable than logging the frequency of the problem behavior itself.

The START was not deemed helpful for treatment evaluation in the present study. The measure has been used successfully in forensic settings (Sakdalan *et al.* 2010), but the variables are not susceptible to frequent change. Therefore, the measure holds greater promise in longitudinal designs, or possibly as a screening instrument to assess viability and appropriateness of treatment pre-enrollment. In the present study, Participant 4 was assessed to have a high risk of unauthorized absence, and this participant did indeed turn out not to benefit from treatment and dropped out halfway through. This participant also had higher levels of externalizing and antisocial behaviors, and was not able to access appropriate support from their companion, factors which likely also affected this individual's retainment of treatment. Some of these factors are covered in the START.

As for the data on hospital admissions, this study notes certain trends of reduction in days hospitalized and times in contact regarding hospitalization, but these outcomes may also be affected by participants' housing situation. It is also not clear how to interpret data on BA, patient-regulated and proactive admissions meant to prevent decline into self-harm. It could be speculated that increased use of BA is a sign of greater insight into one's personal needs and vulnerabilities, as well as greater ability and motivation to take control over one's health. Although data on BA is limited and no conclusions can be drawn, previous studies on BA indicate that these admissions, too, might reduce self-harm in individuals with emotion regulation difficulties (Westling *et al.* 2019). With patient-controlled admissions, patients could be more involved in their care and have the opportunity to use skills from DBT-SS in a concrete way in everyday life. The idea of a synergy effect between BA and DBT-SS treatment is an exciting one, with potential positive impact on self-harm as well as level of function. This is an important prospect for further study.

This study is limited in its methodological structure. Lack of control group and a low number of participants are some of the unavoidable weaknesses of single-case studies (Smith 2012). Add to that the difficulty of finding relevant outcome measures with good reliability and validity, as well as a high number of possible confounding factors, and it is clear that conclusions cannot be drawn on the effect of the DBT-SS intervention on the current sample. The latter problems speak to why a pilot study is helpful as a first step toward evaluating a new treatment, in this case in a new context. Notably though, the DBT-SS model was followed for 48 sessions and participants were followed for 18 months in total, a shorter period than in the original study (Brown *et al.* 2013). This shorter intervention time may have affected participants' retention of skills and treatment benefit. Other issues pertain to data collection; there were issues involving the BRF, both concerning frequency of submission and inter-rater reliability, with differing categorization of red or orange zones between staff. Further, the ability of staff to attend the skills training group and support the individuals, was limited by uncontrollable factors such as turnover and scheduling difficulties at the workplace. A future RCT ought to assess staff adherence to the DBT-SS intervention and its principles. Perhaps the form of training for staff ought to be revised as well, looking into possibilities of individual supervision.

Conclusions

This study suggests that DBT-SS could be a feasible and promising treatment to implement in Swedish psychiatric healthcare for individuals with emotion regulation difficulties, problem behaviors and cognitive challenges. The results indicate that the method could be helpful both to reduce dangerous problem behaviors, such as self-harm, and to increase individuals' level of daily functioning. Expanding knowledge and understanding of the needs of this population and making tailored psychotherapeutic treatment available is imperative. The present study encourages future randomized controlled trials on DBT-SS for this population; such studies would benefit from reducing the number of outcome measures used, simplifying the Behavior Registration Forms and clarifying the instructions to staff.

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Conflict of interest

All authors declare that they have no competing interests.

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