The Autism-Competency-Group (AutCom). A promising approach to promote social skills in adults with autism spectrum disorder and intellectual disability

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Autism spectrum disorders (ASD) are often associated with intellectual disability (ID). ASD-specific group concepts usually focus on people on a high functioning level. The Autism-Competence-Group (AutCom) combines a psycho-educative approach with music and dance/movement interventions in adults with ASD and ID. AutCom includes 16 structured 90-minute sessions to foster social and emotional competencies. This study investigates the acceptability and effectiveness of AutCom. Practicability and acceptability were measured based on participation frequency and patient satisfaction (CSQ-8). Efficacy was assessed in a pre-post design ($N = 12$) based on self- and third-party assessment with a control group matched by gender and level of ID. Primary outcome variables were social and emotional competence, and secondary outcomes were challenging behavior and quality of life. A participation rate of 86% indicated practicability; high CSQ-8 scores ($M = 30$ of max. 32) indicated acceptability. Significant improvement was found in social competence compared to the control group and emotional competence in the pre-post self-assessment on the AutCom questionnaire. No significant improvement was found in challenging behavior and quality of life. AutCom is shown to be a promising and highly accepted group concept in fostering social and emotional skills in adults with ASD and ID.

Keywords: autism spectrum disorder; adults; intellectual disability; social skills; group training; music therapy; dance movement therapy

Autism spectrum disorder (ASD) is a neurodevelopmental condition characterized by difficulties with social communication and interaction, restricted and repetitive patterns of behavior, and sensory over- and under-responsiveness (American Psychiatric Association 2013).

In children and youth ASD showed to be the strongest predictor for mental health conditions compared to intellectual disability (ID), special health care needs and others (Kerns *et al*. 2020). Ratcliffe *et al*. (2015) found that comorbid mental health difficulties are associated with greater social responsiveness difficulties and poorer social skills in youth with ASD, independent of intellectual ability. Social deficits were also found to be risk factors for challenging behaviors and self-injury in children and adolescents with ASD (Waters and Healy 2012). Challenging behaviors are four times higher in adults with ASD and ID compared to those with ID only (McCarthy *et al*. 2010), indicating clinical relevance. All these facts and correlations suggest that the promotion of social skills in people with ASD and ID can help reduce the incidence of challenging behaviors, ameliorate severe behavioral problems and support mental health in this highly vulnerable group.

Social skills training is widespread for adolescents and adults with high functioning autism, however, group training specifically designed for people at a low functioning level are scarce (Hotton and Coles 2016). In this article, we present a group intervention to foster social and emotional skills specifically designed for adults with ID on the autism spectrum. Interventions aim to reduce behavioral problems, prevent comorbid psychiatric conditions, enhance quality of life and are evaluated first-time for effectiveness.

Embodied interventions in people with ASD

Considering the reduced cognitive skills in people with ID, bodily and experience-based interventions may support a holistic learning process and prevent an overload, using purely cognitive strategies. Embodiment theories

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in ASD support nonverbal interventions based on music, dance, and movement. Here, deficits in social-emotional attunement and synchronization with others are seen on a bodily level that is strongly related to motor coordination deficits (Eigsti 2013, MacDonald *et al*. 2013) and a dysfunctional mirror neuron system (MNS) (Dapretto *et al*. 2006). Seen from a bottom-up perspective, the MNS plays a key role in social learning (Molnar-Szakacs and Overy 2006, Vivanti and Rogers 2014), and synchrony-based musical-bodily interventions are an alternative approach in fostering social and emotional skills (Behrends *et al*. 2012, Molnar-Szakacs and Heaton 2012). Mateos-Moreno and Atencia-Doña (2013) evaluated a combined dance/movement and music therapy intervention with 36 one-hour sessions in young adults with ASD ($N = 16$). Findings indicate that combining dance/movement and music therapy could be effective if used regularly to improve autistic symptoms including social interaction, behavioral variability and emotional functioning in adults diagnosed with severe autism.

ASD group interventions for adults with ID

Given that social participation is an indicator of quality of life and overall functioning, social isolation is a mediator between autistic features and mental health (Schiltz *et al*. 2021); thus, certain group concepts have been developed focusing mostly on social skills. For adults with ASD and a mild to moderate learning disability who struggle with social interaction, the National Institute for Health and Clinical Excellence (2012) recommends a group-based social learning program including modeling, peer feedback, discussion and decision-making, explicit rules, and suggested strategies for dealing with socially difficult situations. For psychosocial interventions focusing on daily life skills, a structured and predictable training program based on behavioral principles is recommended. For adults with anger and aggression issues, anger management intervention should be offered which include functional analysis of anger and anger-provoking situations, coping-skills and relaxation training, and the development of problem-solving skills.

Based on the Treatment and Education of Autistic and Communication Related Handicapped Children (TEACCH; Mesibov *et al*. 2004) approach, a group training for the enhancement of social skills in people with ASD (SOKO Autismus; Häußler 2008) has been developed in a German-speaking region. It includes a module designed for adults with ID. A reoccurring structure is described, starting with a mood assessment followed by small group work on ASD-related topics, a common meal break, a second block of small group work, playing a social game together, and then a final round. Although developed for adults, regular one-on-one telephone contact to involve parents in the program is scheduled. A systematic evaluation of the program has not yet been carried out.

The use of video-based group instruction (VGI) to foster social skills in adolescents with ASD and ID ($N = 4$) was evaluated in a public high school setting (Plavnick *et al*. 2015). Mixed results indicate that VGI in high school curricula may be effective for some adolescents with ASD and ID.

In their systematic review on social skills training groups for individuals with ASD, Hotton and Coles (2016) pointed out that reviews of social skills training groups have focused mainly on children. rather than on adolescents and adults. Moreover, of the 13 studies evaluating adult group trainings that met the selection criteria, only one (Liu *et al*. 2013) was designed for people with ID, thus indicating a lack of group concepts for this population, despite it representing a huge part of the entire autism spectrum (Centers for Disease Control and Prevention 2020). The pilot study evaluates a workplace training program ($N = 14$), lasting 6 h a day, 5 days a week, for 6 months, with focus on social communication and emotions, as well as psychoeducation for workplace principles. Significant pre-post improvements in social communication skills and emotional control were observed; however, a risk of bias by not including a control group and the enormous effort of 30 h per week were criticized.

A more recent study evaluated a peer-facilitated group program designed specifically for adults with ASD and limited functional language (Ferguson *et al*. 2020). The SKILL program is based on social motivation and experiential learning in a quasi-natural context. Applied in $N = 5$ findings yielded evidence for social improvements across specific verbal skills and nonverbal behaviors. The program was highly feasible (96% participation rate), and both the participants and their parents displayed program satisfaction.

Current study

Taken together, social group trainings are recommended for people with ASD to support social functioning and to promote mental health. However, concepts designed for adults with ID are rare, and existing approaches need to be further evaluated for efficacy. Consequently, the Autism-Competency-Group (AutCom) was developed, a group offered to adults with ID, who no longer benefit from a one-to-one setting, to foster social, emotional, and practical skills (Bergmann *et al*. 2016). The primary objective of the AutCom concept is to combine behavioral/cognitive-based approaches with embodied/experience-based methods to build an appropriate framework for furthering adults with ASD and mild ID. This pilot study asks three main questions:

1. How practicable and accepted is the AutCom concept for adults with ASD and ID?

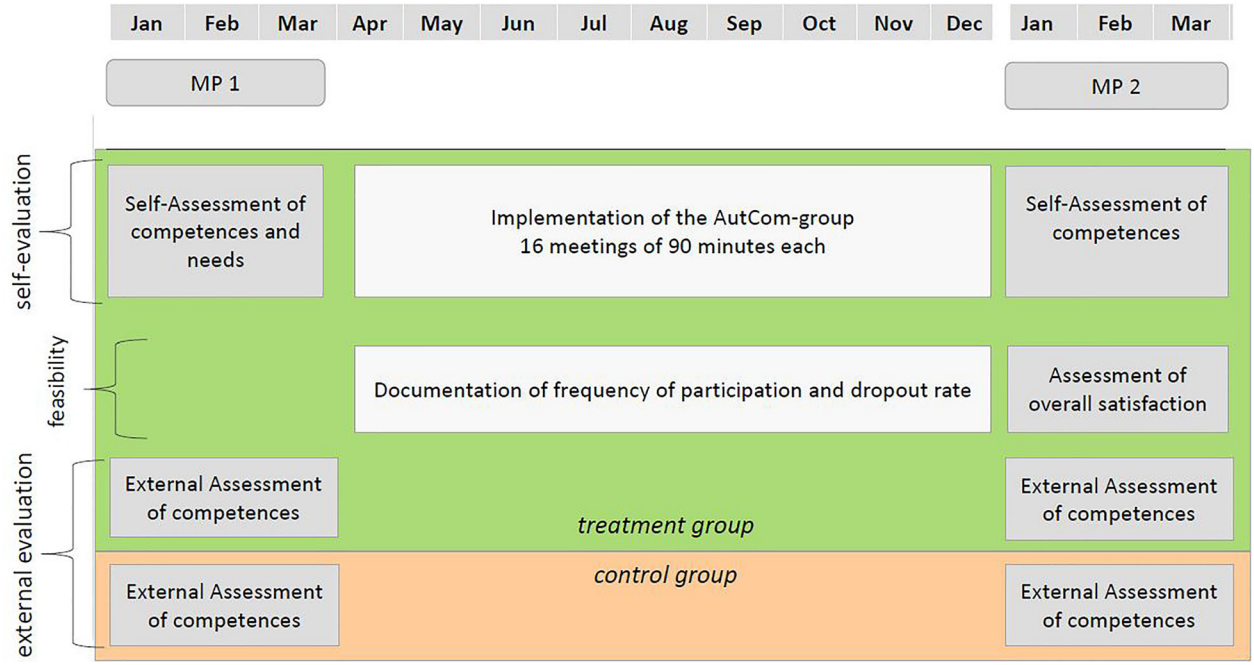

Figure 1. Data collection overview. *Note.* Period: January 2016–March 2017. MP = measurement point.

2. Does the training impact social and emotional skills?
3. Does the training impact challenging behaviors and quality of life?

In evaluating training effectiveness, primary outcome variables were social and emotional competence, and secondary outcomes were challenging behavior and quality of life.

Methods

Design

To test training effectiveness, a quasi-randomized, partly controlled waitlist design was chosen, combining different measures of self- and external assessment (see Figure 1). Baseline measurements were taken at the first measurement point (MP) before the training, and the second data collection followed training completion. To control the influence of external effects, the pre-post variation in externally assessed treatment group parameters was compared with a control group, using external assessment. In addition, a non-controlled, pre-post comparison was performed using self-assessment. Participant acceptance and treatment group satisfaction were assessed at MP 2.

Sampling and participants characteristics

All participants were recruited from the outpatient clinic of a psychiatric department specialized for adults with ID and mental disorders in Berlin, Germany. Inclusion criteria were a minimum age of 18 years and a diagnosis of ASD (ICD-10: F84.x), the presence of mild (F70.x) or moderate (F71.x) ID as well as expressive language use in, at least, short sentences. Exclusion criteria were severe sensory impairments, such as blindness or deafness, but not physical disabilities.

The multiprofessional treatment team was asked to comment on patient eligibility for the group training; this resulted in 19 individuals being identified as potential participants. Four persons were excluded: three were excluded for logistical reasons (excessive travel distances), while for another patient completion of the ASD diagnosis was withstanding. The remaining 15 individuals, or their caregivers/parents, were contacted in early 2016; all expressed their interest in participating.

In line with clinical procedures, ad hoc sampling was chosen by consecutive allocation. The first seven individuals for whom a confirmed participation commitment was available were included in the treatment group. The other eight individuals were consecutively placed on the 2017 waiting list and formed the control group. Two of the seven scheduled participants canceled before the program started (due to city relocation or personal reasons), and in their place, the first person on the waiting list was included in the treatment group. Due to incomplete data at MP 2, one individual from the control group was excluded from the calculations, resulting in a balanced sample of $N = 12$ (see Table 1).

The two groups were identical in gender distribution and were approximately parallel in level of ID, $\chi 2(1, N = 12) = .34$; Fisher's exact test: $p = 1.000$. However, they differed in age; participants in the treatment group were younger on average, $t(10) = -2.791$; $p = .019$.

Measures and data collection

Disability assessment schedule (DAS)

In baseline assessment, ID was measured with the DAS (Meins and Sussmann 1993), a screening scale for the assessment of socio-practical functioning with cut-off values for each level of ID according to DSM-5/ICD-

Table 1. Sample characteristics.

	Total ($N = 12$)	TG ($n = 6$)	CG ($n = 6$)
Gender			
Males	8 (66.7%)	4 (66.7%)	4 (66.7%)
IQ, ID			
<70, mild	7 (53.8%)	3 (50%)	4 (66.7%)
<50, moderate	5 (35.8%)	3 (50%)	2 (33.3%)
Age			
Range	20–55	21–33	20–55
M (*SD*)	35.69 (12.49)	28.33 (4.41)	44.5 (13.49)

Note. TG = treatment group; CG = control group; M = mean; SD = standard deviation.

10. The DAS scores were found to correlate strongly with the Coloured Progressive Matrices ($r = 0.75$) and the Columbia Mental Maturity Scale ($r = 0.77$) (Holmes *et al*. 1982, Meins and Sussmann 1993) indicating its usability to screen for ID level. Applying the DAS was a clinical standard procedure in collecting baseline data; the questionnaire was filled out by reference persons from the patient's immediate home environment.

Client satisfaction questionnaire

To gain quantitative data on acceptability at MP 2, the German version of the Client Satisfaction Questionnaire CSQ-8 (Schmidt *et al*. 1989) was presented. The CSQ-8 screens for global satisfaction with various aspects of a treatment or clinic and was originally developed in a psychotherapeutic setting (Attkisson and Zwick 1982). The questionnaire is not normed, reliability is considered high (Cronbach's alpha = .91), and testing of factorial validity revealed a strong principal factor. The distribution of results is usually left-skewed, as positive ratings occur more often than average. The CSQ-8 has been adapted to the level of the AutCom participants, by the authors usage of simple language and adding colored 'smileys' to the 4-point scales; this version has already been used in a larger scale study.

The practicability of AutCom was measured by its feasibility. After each session, the attendance or absence of the six participants was documented in the minutes. Additionally, all participants were invited individually for debriefings at MP 2 and were asked for feedback on the group training.

AutCom questionnaire

In pre-post evaluation, the AutCom questionnaire was used, although originally developed to assess participant needs. The assessment had already been designed as a list of questions on ASD-related issues for the first two AutCom runs, and it was revised and shortened for this study with regard to easy language and practicability (see Appendix A). The final version contained 40 items that were assigned to the domains of social competencies (communication and interaction; 16 items), emotional competencies (affect regulation and emotion differentiation; 13 items), and action competencies (action planning and motor skills; 11 items). The first two domains were used to assess social and emotional skills, and sum scores were calculated with a maximum of 16 and 13 points respectively, with higher scores indicating greater impairment. Although this questionnaire was developed solely on the basis of everyday clinical practice experience, and has not yet been validated or psychometrically tested, it is still applied for assessing treatment goals and monitoring progress covering relevant core symptom areas, in accordance with DSM 5.

Social responsiveness scale (SRS)

For the assessment of social skills, the German version of the SRS (Bölte and Poustka 2008) was used. This is a parent questionnaire for dimensional ASD diagnostics for assessing various symptom areas, such as social interaction, communication, and stereotyped behavior on a 4-point Likert scale, based on 65 items. According to the authors, the SRS generates an index of social deficits within the ASD context. The German version of the SRS has high values for internal consistency (α = .91–.97) for the total scale in different study samples. It has convergent validity through substantial correlations with established procedures measuring ASD-typical behavior (Bölte *et al*. 2008). The SRS was used in this study because the construct of social responsiveness encompasses several core social skills and because the procedure has been already used for therapy evaluation in other group trainings (Biscaldi *et al*. 2016, Jenny *et al*. 2012).

Aberrant behavior checklist (ABC)

For assessing challenging behaviors, the ABC (Aman and Singh 1986) was used. This scale, originally developed to measure treatment effects in individuals with severe ID, consists of 58 behavior items. The 5-factor structure of the scale is (i) Irritability, Agitation, Crying; (ii) Lethargy, Social Withdrawal; (iii) Stereotypic Behavior; (iv) Hyperactivity, Noncompliance; and (v) Inappropriate Speech and has been validated in $N = 1{,}040$ group home residents (Aman *et al*. 1995).

Modified overt aggression scale (MOAS)

Aggressive behaviors were assessed using the MOAS (Knoedler 1989). The MOAS is a questionnaire designed to assess aggressive behaviors in in four domains: verbal aggression, aggression toward objects, auto aggression, and physical aggression. As behavior items within each domain increase in severity and frequency, diverse deficits in affect/impulse regulation are also revealed. Applied for people with ID, the MOAS showed excellent interrater agreement (ICC = 0.93) in the total score (Oliver *et al*. 2007).

Personal outcomes scale (POS)

Quality of life was assessed using the POS (Van Loon 2008), specifically developed for people with ID. Quality of life indicators are related to eight core domains and three main factors (*independence*: personal development and self-determination; *social participation*: interpersonal relations, social inclusion, and rights; and *well-being*: emotional well-being, physical well-being, and material well-being). All factor scores have an adequate internal consistency with a =.58–.85, correlations between self-report and direct observation versions of the instrument varied from r =.48 to r =.84 per domain, and its construct validity has been supported by both expert judgments and focus groups (Van Loon 2014).

Data collection

For external assessment at MP 1 and MP 2, the same battery of questionnaires (AutCom questionnaire, SRS, ABC, MOAS, and POS) was sent to persons from the home environment (relatives, caregivers) of all participants with the same person conducting the assessment at both MPs. In self-assessment, participants completed the ZUF-8 themselves, participants with reading difficulties had the questions read aloud to them. The AutCom questionnaire used for self-assessment at MP 1 and MP 2 was applied in guided interviews conducted by the therapists for each person individually, since some participants were overwhelmed by completing the questionnaire on their own.

AutCom training overview

Setting

The treatment group participated in a total of 16 AutCom sessions of 90 min each in the period from April to December 2016. Reference persons were invited for the first, middle, and last sessions. The AutCom concept was explained, the participants showed what they had learned, further goals were set, and the use of AutCom elements and spreadsheets in everyday life was discussed with the aim of generalizing treatment effects.

The sessions were conducted by a female psychologist (J.B.) and a male music therapist (T.B.) and took place bi-weekly in a multipurpose room at the outpatient clinic. To keep the group constellation constant, the participants were asked after the first three sessions for a binding confirmation, or refusal for further sessions, and all accepted. Before the start of each session, the multipurpose room was structured in different, clearly demarcated areas, e.g. for music-making, psychoeducation, and retreat. Djembe drums and other instruments were provided on one wall of the room. A flipchart was positioned on the opposite side, and a table with snacks and drinks for the mid-session break was prepared next to it. Chairs in a circle were in the center of the room, with a bell on the floor serving as a stop signal. In the corner, separated by a table from the rest of the room, was a bed and a large beanbag chair for time-out in case of overload. It was agreed with the participants that the circle of chairs could be left anytime if someone needed a break.

The design of the AutCom training is semi-structured, allowing for shifts of emphasis depending on the overall needs of the current training group or topics arising from the course of the group training. Primary training topics, however, are presented in the AutCom questionnaire, i.e. fostering social, emotional, and practical skills. Reoccurring interventions are used throughout the entire training (see interventions) to promote therapeutic effects by repetition. To provide predictability for the participants, a structured sequence of reoccurring sections was chosen for each individual session (see Figure 2).

Interventions

Interventions were based on behavioral approaches, and music and dance/movement therapies were implemented in each session, in accordance with a reoccurring sequence as described above. Aiming to primarily foster social and emotional skills, elements from established concepts were combined.

A relaxation exercise at the beginning of each session was performed, combining the principles of Jacobson's Progressive Muscle Relaxation (Jacobsen 1938) with a mindfulness exercise, using different sounds (e.g. sound bowl). This was constantly used for stress reduction and self-awareness as a precondition for social communication and learning.

Music-based interventions were mainly performed using djembe drums. Firstly, these interventions aimed to foster social skills by rhythmic synchronization in joint drumming, with different roles (leader or follower) and nonverbal dialogue in reciprocal play. Secondly, musical dynamics were used to experience and express different levels of psychomotor arousal in a bodily and multi-sensory yet playful manner (e.g. auditive, tactile, motor). Musical dynamics were linked to psycho-education for stress management, using a 5-point scale.

In psychoeducation, structure and visualization were used in accordance with the TEACCH approach. Spreadsheets were given to the participants for homework and to incorporate principles and skills of the training in everyday life. Social competencies were trained using presentations with visual aids (e.g. comic strip conversations), group discussions, partner exercises, and role play. Emotional issues were managed by using visual aids, such as a drawn body image on a sheet of paper (see Appendix B), but always in reference to the participant's own body.

Dance/movement interventions were based on free bodily expression and interactive motor synchrony.

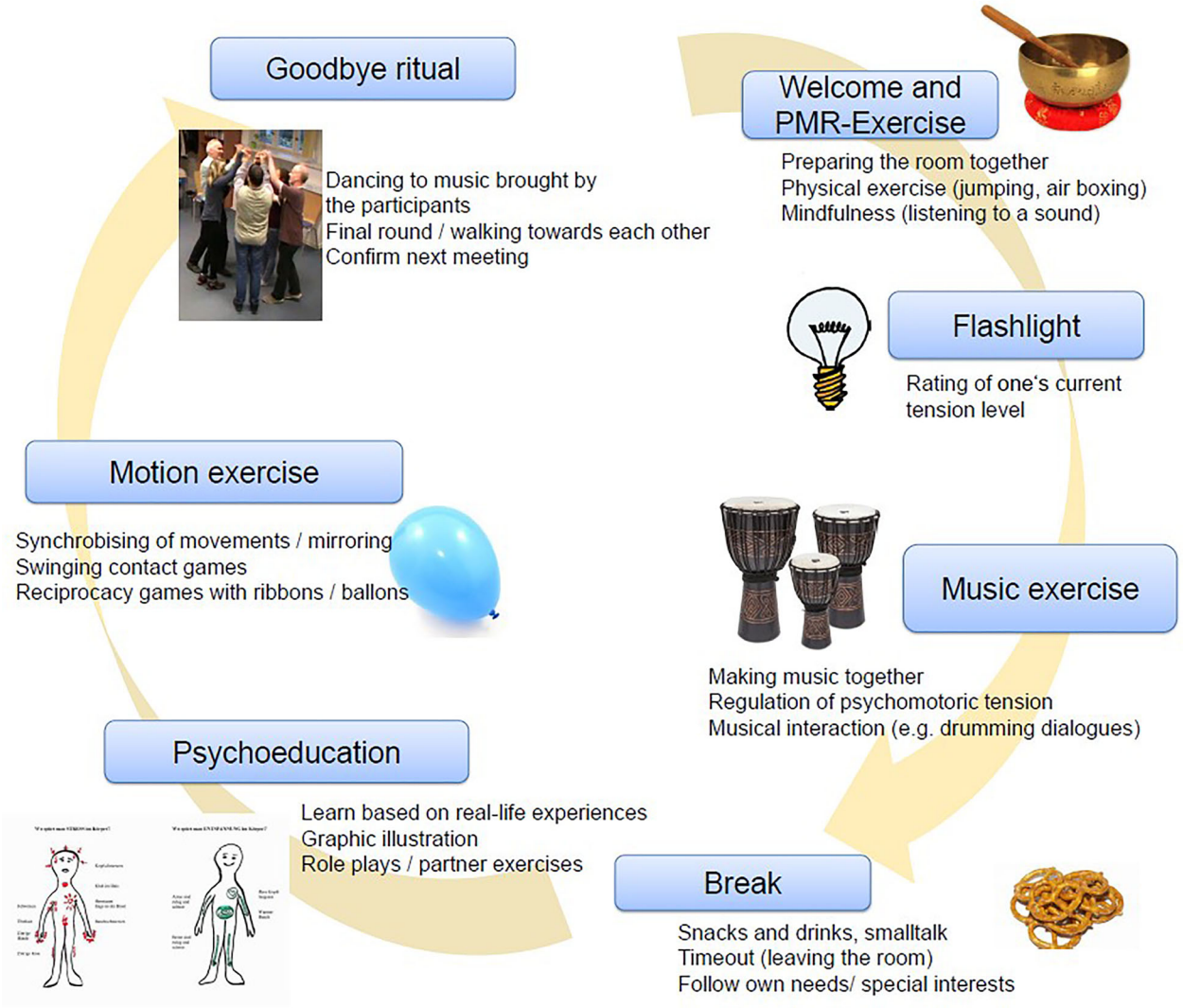

Figure 2. Sequence of reoccurring AutCom sessions.

These were used to foster social affect and empathy correspondingly with basic social interactive skills. Additionally, motor coordination tasks were performed linked to practical skills and self-awareness.

Affect regulation and handling or managing stress represented the central topics of the AutCom group training and were therefore addressed throughout the entire program. A scale (1–5) for psychomotor arousal was used throughout many interventions as a means for individuals to communicate their emotional state (see Appendix C). It originated from an adaptation of Dialectic Behavioral Therapy (DBT) for adults with intellectual disability and impulse control malfunction (Elstner *et al*. 2012).

Statistics

All analyses were performed with SPSS 22.0 (IBM Corp 2013). In assessing acceptability, the mean CSQ-8 score across all participants was calculated. In self-assessment via the AutCom questionnaire, sum values per domain were calculated for pre and post measurement (MP 1 & MP 2); the mean value was then calculated for all test persons. To check for significant pre-post changes Wilcoxon tests were computed. In external assessment, the difference of the sum values (MP 1–MP 2) was calculated in both groups for SRS, ABC, POS, and the AutCom questionnaire. Group differences were checked for significance using Mann-Whitney U tests. Missing values were found in the external assessment since individual items in the SRS and the AutCom questionnaire were omitted. However, since these occurred randomly and unsystematically, and since each scale accounted for less than 1% of the total values (SRS: 0.44%; AutCom: 0.43%), it can be assumed that they did not distort results.

Results

AutCom acceptability

No participant withdrew from the training in the AutCom group, i.e. the dropout rate was 0. Across all dates and all individuals, a participation rate of 86% was calculated. The satisfaction rating with the CSQ-8 resulted in a mean score of 30.00 points ($SD = 1.41$, range 28–32), from a maximum of 32 possible points.

Table 2. Results of the external assessment.

	Treatment group		Control group		Group comparison[a]	
	pre *M (SD)*	post *M (SD)*	pre *M (SD)*	post *M (SD)*	*z* score	*p* value
Social skills						
SRS	98.50 (22.92)	93.83 (27.32)	118.33 (13.71)	114.33 (13.17)	−.080	.936
AutCom social	11.5 (2.26)	10.33 (1.97)	8.83 (3.65)	11.83 (1.94)	−2.258	.024*
Emotional skills						
AutCom emotional	8.50 (2.26)	8.00 (2.90)	7.67 (1.86)	9.33 (1.86)	−.567	.570
Challenging behavior						
ABC	49.67 (38.56)	45.00 (32.02)	47.67 (19.16)	46.83 (18.29)	−.320	.173
MOAS	11.67 (9.07)	13.83 (12.09)	10.67 (11.86)	4.50 (4.76)	−1.363	.173
Quality of life						
POS	36.33 (8.33)	35.50 (7.42)	37.67 (10.17)	39.83 (9.28)	−.968	.333

Note. Change in raw values of the two groups, higher test scores correspond to stronger deficits.
M = mean; SD = standard deviation.
[a]Mann-Whitney-U-test.
*$p < .05$.

AutCom preliminary efficacy

The external assessment resulted in improvements of the treatment group on all scales, except for the MOAS. As to primary outcomes, significant group differences in social skills measured with the AutCom subscale were shown to be significant ($p = 0.024$). However, SRS measurement of the same construct showed no significance. Emotional skills, as measured with the AutCom subscale, did not improve significantly in comparison to the control group. Measuring secondary outcomes (challenging behaviors and quality of life) showed no significant results as measured with the ABC, MOAS, and POS. See Table 2 for details.

The participants' self-assessment of the treatment group resulted in pre-post improvements on all subscales of the AutCom questionnaire. Measurement of primary outcome improvements in emotional skills were proven significant ($p = .042$; see Figure 3).

Discussion

This AutCom training pilot study aimed to assess the feasibility, acceptability, and preliminary efficacy of a novel approach combining educational principles with musical-bodily interventions to foster social and emotional skills in adults with ASD and mild to moderate ID. The high participation rate and almost maximum scores on the CSQ-8 measuring training satisfaction indicated the practicability and acceptability of the AutCom concept. Regarding primary outcomes, mixed results were found. The efficacy of the training was supported by significant group differences on the AutCom social subscale, however, improvement on the SRS was not significant. Measuring emotional competence differed in significant pre-post progress in self-assessment on the AutCom emotional score. The same subscale, applied in external assessment, however, showed no significant improvement. In considering secondary outcomes, no significant changes in challenging behaviors and quality of life were found in comparison to the controls.

AutCom feasibility was operationalized via dropout rate and participation frequency and rated as high, due to the positive values. High participant motivation in attending the group was additionally supported by the fact that months before training termination, participants questioned the possibility of further AutCom training. Ferguson *et al.* (2020) pointed out that social motivation is linked to a willingness to engage with others in the context of social learning activities, which in turn, determines the effectiveness of skill acquisition. They considered experiential learning activities and a supportive group context as key elements for high feasibility and patient satisfaction in piloting their peer-mediated SKILL program for adults with ASD and ID. In AutCom, the fact that all participants completed the entire training and attended frequently may be the result of such a participatory approach, as demonstrated with a needs assessment, consideration of the participants' individual goals and requirements, an ASD-friendly design focusing on predictability and structure, as well as playful and experience-based methods combined with behavioral principles. The results of CSQ-8 indicate a high satisfaction level, supported by a basically positive attitude tone prevailing in almost all group meetings. Attkisson (1982) reported that greater satisfaction is associated with client-reported symptom reduction. Thus, high CSQ-8 scores may be seen as a promising factor in successful treatment and support.

In terms of efficacy, the main positive finding was a significant improvement in social skills compared to the control group, as measured with the AutCom questionnaire. No significant group differences were found regarding SRS, however, and the control group improved to the same extent as a baseline with higher deficits. Based on the participants' learning disabilities and increased difficulties with transfer of experiences made in one context to another, the generalization of possible positive changes in the treatment context may be limited. In reflecting on the group process after each session and documenting observations of each participant, many positive changes were found on a

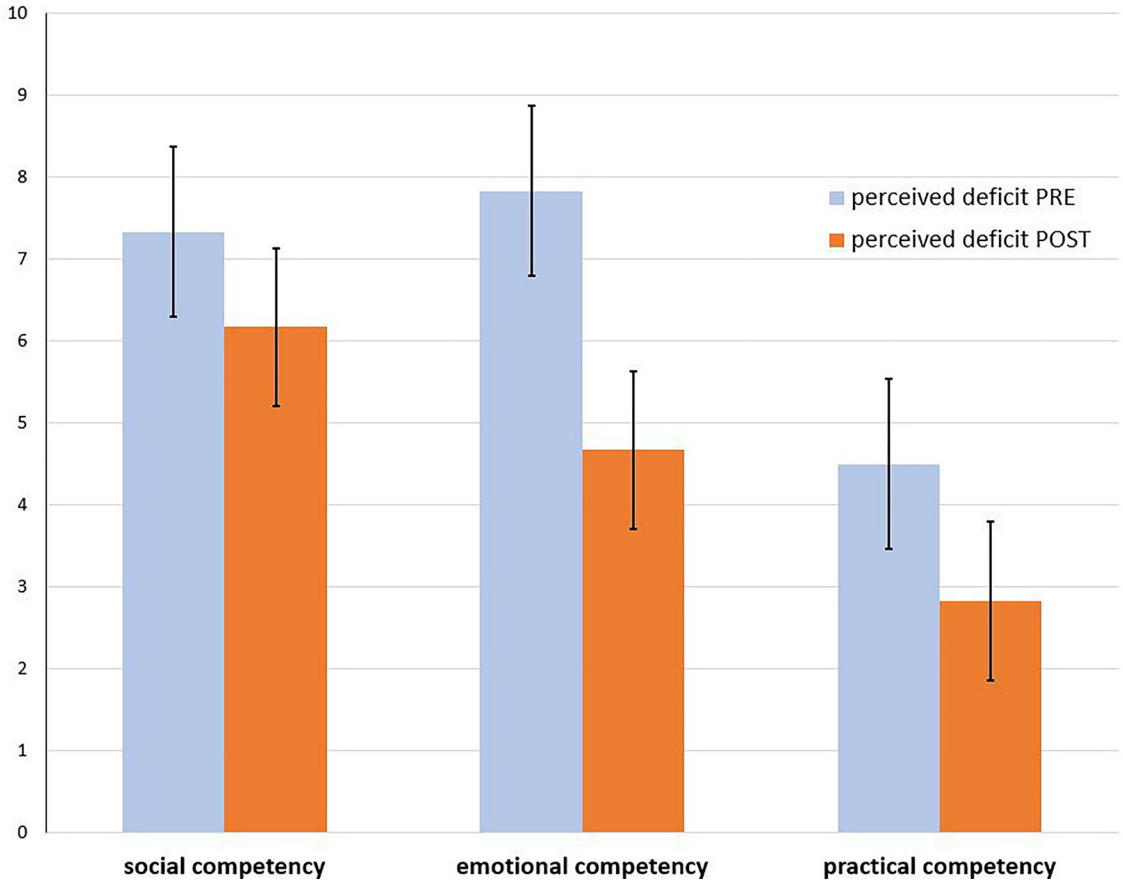

Figure 3. Results of the self-assessment.

descriptive level. This may indicate an increase in the frequency of weekly sessions, which totaled of approximately 40 AutCom training sessions. This would be a comparable amount of training as in the study from Mateos-Moreno and Atencia-Doña (2013), supporting combined dance/movement and music-based interventions for adults with severe ID. Moreover, the authors found the positive effects increased over time using multiple MPs and concluded that interventions be carried out regularly. Compared to the daily 6-hour workplace training by Liu *et al.* (2013) with significant improvements in social skills and emotional control in people with ID, AutCom appears highly economical. However, progress requires repetition, and experience-based learning takes time, which should be considered in the treatment and support of people with ID. Another means of supporting the generalization of positive experiences and treatment effects is that of a systemic approach. This was achieved by contacting reference persons before the training started, and inviting them for the first, middle, and last sessions. All of them agreed upon the aims of the program, but the methods and interventions needed to be explained repeatedly. Thus, not all the participants received support for implementing elements of the AutCom training in their everyday lives. Here, regular telephone counselling, as presented by Häußler (2008) in her TEACCH-based group training for adults, may assist in supporting the transfer of a positive impact from the training to everyday living.

In assessing emotional outcomes, mixed results were found. In self-assessment, the highest pre-post differences were reported for emotional outcomes as compared to social and practical competencies, thus indicating a significant improvement. However, only slight improvements were reported in external assessment, completed by reference persons. This may be due to the dyadic construct of emotional competence as measured by the AutCom questionnaire. On the one hand, emotion perception and expression are linked to social skills, while on the other hand, affect regulation and the ability to manage stress are associated with high arousal and aggression. Of all the scales applied, the MOAS score for measuring aggressive behaviors was the only one that increased in the pre-post comparison. This indicates that the individual's subjective perception of progress in regulating their own emotional states differed from the third-party everyday assessment. Dealing with stress and arousal was a central concern of the participants, however, and it played a key role throughout the training. Beyond the subjective self-assessment, there may have been emotion regulation improvement in the treatment context, with no reduction in aggressive behaviors in everyday life. This should be further investigated with a focus on generalization of training effects.

Apart from this, a bias was found resulting from the specific MOAS algorithm. Various forms of aggressive, dysregulated behavior are assessed and arranged according to increasing severity, with more severe manifestations additionally multiplied by a higher factor. Thus, relatively slight changes have a strong impact and can significantly influence the overall score. For example, with one patient in the treatment group, only one symptom from the auto-aggression domain was determined for MP 1, whereas two symptoms were determined for MP 2. Due to factor weighting, this assessment was included in the total score, with three points for MP 1 but with 15 points for MP 2, and impacting mean value. During the intervention period, this patient repeatedly exhibited auto-aggressive behavior which varied in severity and could not be reliably recorded. Examination of the items at the individual level showed that the increase in overall MOAS mean tended to be based on such nonsystematic changes rather than actual impairment increase. In practice, concerning the patient's auto-aggressive behavior, the focus is not on a measurable increase or decrease of a sum score but on the affected person's distress and how this can best be addressed. For example, the topic of self-injury as an expression of arousal and alternative strategies to regulate inner tension were discussed and practiced in the group. However, due to the relatively low number of AutCom sessions, no profound change in behavior was achieved. Again, higher-frequency interventions and greater involvement of the home environment may be beneficial.

Given that on a descriptive level, individual and group progress was observed by the therapists, the use of a video-based measurement in addition to established scales seem reasonable. All meetings were videotaped but not systematically evaluated. Potentially quantifiable descriptive categories could include gaze behavior, verbal participation, and musical or dance expression as measured in music therapy for children with ASD by Kim *et al*. (2008), or communication skills as measured systematically in adults with ID by Ferguson *et al*. (2020). Furthermore, goal attainment scaling may be useful in addition to standardized scales to measure individual progress, which is especially important for studies with a small sample size.

On secondary outcomes, i.e. challenging behaviors and quality of life, no significant changes were found. Even though challenging behaviors are a major topic in people with ID and are the most common reason for hospital admission (Oxley *et al*. 2013), and quality of life is an emerging issue, considering deinstitutionalization and integration of people with ID (Chowdhury and Benson 2011), neither of these constructs is of primary focus in AutCom training. Given clear evidence on the efficacy of a possibly slightly modified AutCom training, these issues may be considered in upcoming long-term studies. An overall construct such as quality of life, however, is multifaceted and is not clearly attributable to a single intervention or training. However, with AutCom, we attempt to improve mental health and contribute towards a fulfilling life for people with ID who are on the autism spectrum, and we strive for a framework allowing for social and emotional development.

Limitations

Firstly, our study is limited due to the small sample size, meaning it is not possible to generalize results. This also affects the *p* value, which decreases in larger samples. Consequently, in further studies, a multicenter evaluation of the program using larger samples is desirable. Secondly, the AutCom questionnaire has not yet been psychometrically tested; thus, significant results in self- and external assessment must be interpreted with caution. However, the questionnaire showed to be especially useful, due to its focus on the specific goals of the training, and a consistent implementation with different raters may allow for initial psychometric evaluation. In future research, a standardized scale measuring emotional skills should be added alongside the AutCom emotional subscale. Thirdly, with a pre-post design, the persistence of possible treatment effects has yet to be assessed with follow-up measurement, e.g. six months after the training. Fourthly, reference persons who completed the questionnaires were not blinded to the group allocation and took part by participating in the first, middle, and last session. By providing them with positive and/or critical expectations of the program, their judgment may have been biased. Finally, the therapist-conducted participant interviews may have resulted in a social desirability bias in their response behavior. Additionally, not all of the participants were able to read, so they were unable to complete the questionnaire independently. In further AutCom evaluation, the interviewers should be third party persons who are not involved in conducting the training nor in external assessment and, at best, blinded to group allocation.

Future directions

Taken together, the AutCom approach is promising and the high participant applicability and motivation encourages further development and research. For defining specific AutCom guidelines, the publication of a training manual is planned. This will include general information on ASD in people with ID, specific needs, setting and structure of the sessions, generalization of treatment effects, AutCom elements in detail, and an online compilation of forms, worksheets, specific interventions, and further materials.

Using the manual as a basis, a multicenter study may allow for an appropriate sample size for evaluating effectiveness—beneficial for evidence-based research on group training in a field currently biased by small

samples. In addition to pre-post assessment, a follow-up measurement is needed to prove generalization of training outcomes. Given the primary outcomes of this study, social and emotional skills are very broadly defined. Assessing sub-constructs, including emotion regulation, social drive, verbal communication, or dialogue capability, would provide better guidance for best practice and further research. In assessing more specific predefined outcomes, it will be suitable to use subscales of well-established measures, as with the SRS in a recent study evaluating social competence group intervention for children with ASD (Kylliäinen *et al.* 2020).

A standard training procedure is the needs assessment via AutCom questionnaire for identifying individual treatment goals. In the current study, the AutCom questionnaire proved useful as brief outcome measure, however, due to dichotomous items, there is poor sensitivity for change. In future evaluation, we plan to apply goal attainment scaling (GAS; Kiresuk and Sherman 1968) for measuring progress at an individual level in participants' chosen areas of improvement, as identified by the AutCom questionnaire. GAS proved a promising approach, applied in RCTs evaluating psychosocial interventions in ASD (Ruble *et al*. 2012).

A participatory approach is a key training element and will be recognized in further development. In the last AutCom runs, documented feedback rounds were proven advantageous for motivation and focus—thus fostering social interaction and competence. A further step would be to include AutCom participants, who have already completed the program, as experts. This is the case by offering a co-productive workshop on experience-based AutCom interventions, in collaboration with a person with mild ID, at an international ID-congress.

A further step would be to include persons with ID, who've already completed the training, as co-therapists and co-researchers. Within the training context, they may serve as role models—being autistic themselves and coping with the challenges of daily life. In the research context, they may monitor treatment goals and techniques for appropriateness and usefulness for the targeted population: people with ASD and mild ID. Done systematically with an adequate infrastructure, this may contribute to best practice, empowerment, and community awareness (Di Lorito *et al*. 2018).

Conclusion

The AutCom concept is characterized by methodological diversity and the practical implementation of current findings from body- and affect-related research. The training, which combines behavioral principles with musical-bodily interventions in an ASD-friendly framework, is shown to be highly accepted by adults with mild ID. Overall, the AutCom is a promising approach in fostering social and emotional skills in this group supporting mental health, but there is a need for further proof of efficacy based on a larger sample.

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Disclosure statement

None of the authors or other persons involved in this study have any interests that might be interpreted as influencing the research.

Ethical approval

All data were acquired in a routine patient-care setting in accordance with legal requirements of the local hospital law. All procedures were performed in accordance with the Ethical Standards of the Institutional Research Committee and with the 1964 Declaration of Helsinki and its later amendments, or with comparable ethical standards.

Informed consent

Informed consent was obtained from all individual participants included in the study or from their legal guardians.

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References

Aman, M. G. and Singh, N. N. 1986. *Aberrant behavior checklist: ABC*. New York: Slosson Educational Publications.

Aman, M. G., Burrow, W. H. and Wolford, P. L. 1995. The Aberrant Behavior Checklist-Community: Factor validity and effect of subject variables for adults in group homes. *American Journal of Mental Retardation: AJMR*, 100, 283–292.

American Psychiatric Association. 2013. *Diagnostic and statistical manual of mental disorders: DSM-5*. 5th ed. Washington, DC: Author.

Attkisson, C. and Zwick, R. 1982. The client satisfaction questionnaire. *Evaluation and Program Planning*, 5, 233–237.

Behrends, A., Müller, S. and Dziobek, I. 2012. Moving in and out of synchrony: A concept for a new intervention fostering empathy through interactional movement and dance. *The Arts in Psychotherapy*, 39, 107–116.

Bergmann, T., Herberger, K., Birkner, J. and Sappok, T. 2016. AutKom: A musical-bodily-based group training supporting adults with autism and intellectual disability. *Nordic Journal of Music Therapy*, 25, 119–119.

Biscaldi, M., Paschke-Müller, M., Rauh, R. and Schaller, U. M. 2016. Evaluation des Freiburger TOMTASS. *Zeitschrift Für Psychiatrie, Psychologie Und Psychotherapie*, 64, 269–275.

Bölte, S. and Poustka, F. 2008. *SRS: Skala zur Erfassung sozialer Reaktivität: Dimensionale Autismus-Diagnostik (Deutsche Fassung der Social Responsiveness Scale (SRS)/von John N. Constantino und Christian P. Gruber)*. Bern: Huber.

Bölte, S., Poustka, F. and Constantino, J. N. 2008. Assessing autistic traits: Cross-cultural validation of the Social Responsiveness Scale (SRS). *Autism Research*, 1, 354–363.

Centers for Disease Control and Prevention. 2020. Prevalence of autism spectrum disorder among children aged 4 years: Autism and developmental disabilities monitoring network, 11 sites, United States, 2016. *MMWR Surveillance Summaries*, 69, 1–12.

Available at: <www.cdc.gov/mmwr/volumes/69/ss/pdfs/ss6904a1-H.pdf>.
Chowdhury, M. and Benson, B. A. 2011. Deinstitutionalization and quality of life of individuals with intellectual disability: A review of the international literature. *Journal of Policy and Practice in Intellectual Disabilities*, 8, 256–265.
Dapretto, M., Davies, M. S., Pfeifer, J. H., Scott, A. A., Sigman, M., Bookheimer, S. Y. and Iacoboni, M. 2006. Understanding emotions in others: Mirror neuron dysfunction in children with autism spectrum disorders. *Nature Neuroscience*, 9, 28–30.
Di Lorito, C., Bosco, A., Birt, L. and Hassiotis, A. 2018. Co-research with adults with intellectual disability: A systematic review. *Journal of Applied Research in Intellectual Disabilities: JARID*, 31, 669–686.
Eigsti, I.M. 2013. A review of embodiment in autism spectrum disorders. *Frontiers in Psychology*, 4, 224.
Elstner, S., Schade, C. and Diefenbacher, A. eds. 2012. *DBToP-gB-Manual für die Gruppenarbeit: An der Dialektisch Behavioralen Therapie orientiertes Programm zur Behandlung emotionaler Instabilität bei Menschen mit geistiger Behinderung*. Bielefeld: Bethel-Verl.
Ferguson, E. F., Drapalik, K. N., Liang, J., Hua, K., Feerst, H., Mallory, A. B. and Vernon, T. W. 2020. Social interaction skill intervention for autistic adults with intellectual disability and limited language: A pilot of the SKILL program. *Journal of Autism and Developmental Disorders*.
Häußler, A. 2008. *SOKO Autismus: Gruppenangebote zur Förderung sozialer Kompetenzen bei Menschen mit Autismus; Erfahrungsbericht und Praxishilfen*. 2nd ed. Dortmund: Verl. Modernes Lernen.
Holmes, N., Shah, A. and Wing, L. 1982. The Disability Assessment Schedule: A brief screening device for use with the mentally retarded. *Psychological Medicine*, 12, 879–890.
Hotton, M. and Coles, S. 2016. The effectiveness of social skills training groups for individuals with autism spectrum disorder. *Review Journal of Autism and Developmental Disorders*, 3, 68–81.
IBM Corp. 2013. *IBM SPSS statistics for Windows, version 22.0 [Computer software]*. New York: IBM Corp.
Jacobsen, E. 1938. *Progressive relaxation: A physiological and clinical investigation of muscular states and their significance in psychology and medical practice* (1st ed.). Chicago, IL: University of Chicago Press.
Jenny, B., Goetschel, P., Isenschmid, M. and Steinhausen, H.C. 2012. *KOMPASS - Kompetenztraining für Jugendliche mit Autismus-Spektrum-Störungen: Ein Praxishandbuch für Gruppen- und Einzelinterventionen. Content plus*. 1st ed. Stuttgart: Kohlhammer.
Kerns, C. M., Rast, J. E. and Shattuck, P. T. 2020. Prevalence and correlates of caregiver-reported mental health conditions in youth with autism spectrum disorder in the United States. *The Journal of Clinical Psychiatry*, 82.
Kim, J., Wigram, T. and Gold, C. 2008. The effects of improvisational music therapy on joint attention behaviors in autistic children: A randomized controlled study. *Journal of Autism and Developmental Disorders*, 38, 1758–1766.
Kiresuk, T. J. and Sherman, R. E. 1968. Goal attainment scaling: A general method for evaluating comprehensive community mental health programs. *Community Mental Health Journal*, 4, 443–453.
Knoedler, D. W. 1989. The modified overt aggression scale. *The American Journal of Psychiatry*, 146, 1081–1082.
Liu, K. P. Y., Wong, D., Chung, A. C. Y., Kwok, N., Lam, M. K. Y., Yuen, C. M. C., Arblaster, K. and Kwan, A. C. S. 2013. Effectiveness of a workplace training programme in improving social, communication and emotional skills for adults with autism and intellectual disability in Hong Kong-a pilot study. *Occupational Therapy International*, 20, 198–204.
MacDonald, M., Lord, C. and Ulrich, D. A. 2013. The relationship of motor skills and social communicative skills in school-aged children with autism spectrum disorder. *Adapted Physical Activity Quarterly*, 30, 271–282.
Mateos-Moreno, D. and Atencia-Doña, L. 2013. Effect of a combined dance/movement and music therapy on young adults diagnosed with severe autism. *The Arts in Psychotherapy*, 40, 465–472.
McCarthy, J., Hemmings, C., Kravariti, E., Dworzynski, K., Holt, G., Bouras, N. and Tsakanikos, E. 2010. Challenging behavior and co-morbid psychopathology in adults with intellectual disability and autism spectrum disorders. *Research in Developmental Disabilities*, 31, 362–366.
Meins, W. and Sussmann, D. 1993. Evaluation of an adaptive behaviour classification for mentally retarded adults. *Social Psychiatry and Psychiatric Epidemiology*, 28, 201–205.
Mesibov, G. B., Shea, V. and Schopler, E. 2004. *The TEACCH approach to autism spectrum disorders*. New York: Springer. Available at: http://www.loc.gov/catdir/enhancements/fy0818/2004051533-b.html
Molnar-Szakacs, I. and Heaton, P. 2012. Music: A unique window into the world of autism. *Annals of the New York Academy of Sciences*, 1252, 318–324.
Molnar-Szakacs, I. and Overy, K. 2006. Music and mirror neurons: From motion to 'e'motion. *Social Cognitive and Affective Neuroscience*, 1, 235–241.
National Institute for Health and Clinical Excellence. 2012. Autism in adults: Diagnosis and management. Available at: www.nice.org.uk/guidance/cg142/chapter/1-guidance
Oliver, P. C., Crawford, M. J., Rao, B., Reece, B. and Tyrer, P. 2007. Modified Overt Aggression Scale (MOAS) for people with intellectual disability and aggressive challenging behaviour: A reliability study. *Journal of Applied Research in Intellectual Disabilities*, 20, 368–372.
Oxley, C., Sathanandan, S., Gazizova, D., Fitzgerald, B. and Puri, B. K. 2013. A comparative review of admissions to an intellectual disability inpatient service over a 10-year period. *British Journal of Medical Practicioneers*, 6. Available at: https://www.bjmp.org/files/2013-6-2/bjmp-2013-6-2-a611.pdf
Plavnick, J. B., Kaid, T. and MacFarland, M. C. 2015. Effects of a school-based social skills training program for adolescents with autism spectrum disorder and intellectual disability. *Journal of Autism and Developmental Disorders*, 45, 2674–2690.
Ratcliffe, B., Wong, M., Dossetor, D. and Hayes, S. 2015. The association between social skills and mental health in school-aged children with autism spectrum disorder, with and without intellectual disability. *Journal of Autism and Developmental Disorders*, 45, 2487–2496.
Ruble, L., McGrew, J. H. and Toland, M. D. 2012. Goal attainment scaling as an outcome measure in randomized controlled trials of psychosocial interventions in autism. *Journal of Autism and Developmental Disorders*, 42, 1974–1983.
Schiltz, H. K., McVey, A. J., Dolan Wozniak, B., Haendel, A. D., Stanley, R., Arias, A., Gordon, N. and Van Hecke, A. V. 2021. The role of loneliness as a mediator between autism features and mental health among autistic young adults. *Autism*, 25, 545–555.
Schmidt, J., Lamprecht, F. and Wittmann, W. W. 1989. Zufriedenheit mit der stationären Versorgung. Entwicklung eines Fragebogens und erste Validitätsuntersuchungen [Satisfaction with inpatient management. Development of a questionnaire and initial validity studies]. *Psychotherapie, Psychosomatik, Medizinische Psychologie*, 39, 248–255.
Van Loon, J. 2008. *POS personal outcomes scale: Individuelle Qualität des Lebens; Score-Buch*. Gelsenkirchen: Sozialwerk St. Georg.
Van Loon, J. 2014. Personal outcomes scale. In A. C. Michalos (Ed.), *Encyclopedia of quality of life and well-being research*. Dordrecht: Springer Reference, pp. 4744–4747.
Vivanti, G. and Rogers, S. J. 2014. Autism and the mirror neuron system: Insights from learning and teaching. *Philosophical Transactions of the Royal Society of London, Series B*, 369, 20130184.
Waters, P. and Healy, O. 2012. Investigating the relationship between self-injurious behavior, social deficits, and cooccurring behaviors in children and adolescents with autism spectrum disorder. *Autism Research and Treatment*, 2012, 156481.

Appendix A:

AutCom Autism Competence Group

For Adults with Autism and Intellectual Disability

Participant: ……..……..

Reference person: ……

Date: ……..

Your opinion matters!

We would like to involve you in the design of the Autism Competence Training (AutCom). The group training is based on the needs of the participants.

We want to improve everyday skills and increase life satisfaction.

For each competence, please tick ☺ (is done well) or ☹ (is not done well). Please mark next to it whether this competence is an important issue or goal for the participant (+) or rather not (-). Please decide spontaneously and do not leave anything out.

Thank you!

Social Competency

1. Talking with others / understanding others (communication)	☺	☹		+	-
1.1 Complimenting others, saying something nice to others					
1.2 Criticizing others					
1.3 Looking others in the eye when speaking / maintaining eye contact					
1.4 Use of gestures when speaking					
1.5 Listening without interrupting the other person					
1.6 Noticing when something is funny / understanding jokes and irony					
1.7 Chatting with others / small talk					
1.8 Finding a beginning and an end in a conversation					
1.9 Talking about what is important to the other person					
Additional points:	☺	☹		+	-

2. Being in a group (social interaction)	☺	☹		+	-
2.1 Like to participate in group activities (e.g., trips, ball game)					
2.2 Having consideration for others					
2.3 Comforting others					
2.4 Agreeing with others on group rules (willingness to compromise)					
2.5 Intervening when someone says or does something bad					
2.6 Putting oneself in the center of attention (e.g., being the "boss" in a group)					
2.7 Finding the right distance to others					
Additional points:	☺	☹		+	-

Emotional Competency

3. Being able to deal with stress (affect regulation)	☺	☹	+	-
3.1 Calming oneself when feeling internal stress				
3.2 Keeping busy during breaks / dealing with boredom				
3.3 Adjusting to new situations (family, work)				
3.4 Waiting without getting upset				
3.5 Accepting schedule changes (e.g., sudden replacement traffic)				
3.6 Dealing with loud noises (e.g., traffic noise, loud music)				
3.7 Processing many stimuli at once (e.g., many people talking at the same time)				
Additional points:	☺	☹	+	-

4. Recognizing feelings (mentalization)	☹	☺	+	-
4.1 Perceiving one's own needs (hunger, thirst, tiredness...)				
4.2 Feel feelings in one's own body (anger, joy, sadness...)				
4.3 Differentiating feelings (e.g., excitement caused by joy or by fear)				
4.4 Showing and expressing emotions (facial expressions, gestures, voice)				
4.5 Noticing how another person is doing				
4.6 Estimating what the mood is like in a group (e.g., when arriving later)				
Additional points:	☹	☺	+	-

Appendix B:

AutCom worksheet: feeling emotions in one's own body

What causes Stress?

- LIFT RIDE
- HAIR PULLING
- LOST KEY
- WHERE IS THE CAT?
- NO MOBILE PHONE RECEPTION
- MISS THE BUS

How do I feel Stress?

- STRESS THOUGHTS
- HEADACHES
- WEEPING
- TEETH CLENCHING
- TIGHT NECK
- LUMP IN THE THROAT
- SWEATING (UNDER ARMS, ON HANDS)
- STOMACH PAIN
- LOOPS IN THE BELLY
- TREMBLING LEGS

Appendix C:

AutCom worksheet: scale for psychomotor arousal