

Group versus individual occupational therapy for toddlers with autism as a means to improve access to public health-care services. Randomised controlled pilot study

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Abstract

Introduction: In recent years, the increasing prevalence of autism-spectrum disorder has resulted in an increased demand for therapies including occupational therapy. In this pilot trial, we aimed to compare the efficacy of group versus individual occupational therapy among toddlers with autism as a means to improve accessibility to care.

Methods: Toddlers (2–4 years) undergoing autism evaluation in our public child developmental centre were recruited and randomised to receive 12 weekly sessions of group or individual occupational therapy based on the same mode of intervention: Developmental, Individual-Differences and Relationship-based (DIR). Primary outcomes related to intervention implementation included waiting days, nonattendance, intervention period, number of sessions attended and therapist satisfaction. Secondary outcomes were the Adaptive Behaviour Assessment System questionnaire, the Paediatric Quality of Life Inventory and the Peabody Developmental Motor Scale (PDMS-2).

Results: Twenty toddlers with autism were included, 10 in each occupational therapy mode of intervention. Children waited fewer days before beginning group occupational therapy compared to individual therapy (52.4 ± 28.1 vs. 108.8 ± 48.0 days $p < 0.01$). Mean numbers of nonattendance was similar for both interventions (3.2 ± 2.82 vs. 2 ± 1.76 , $p > 0.05$). Worker satisfaction scores were similar at the beginning and end of the study (6.1 ± 0.4 vs. 6.07 ± 0.49 , $p > 0.05$). There were no significant differences between the percentage changes in individual and group therapy outcomes for adaptive score (6.0 ± 16.0 vs. 4.5 ± 17.9 , $p > 0.05$), quality of life (1.3 ± 20.9 vs. 18.8 ± 24.5 , $p > 0.05$) and fine motor skills (13.7 ± 36.1 vs. 15.1 ± 41.5 , $p > 0.05$).

Conclusions: In this pilot study, the group DIR-based occupational therapy for toddlers with autism improved access to services and allowed earlier interventions, with no clinical inferiority to individual therapy. Further research is required to examine group clinical therapy benefit.

Haim Bassan and Orna Tal Equal contribution.

KEYWORDS

autism-spectrum disorder, group therapy, occupational therapy services, waiting days

1 | INTRODUCTION

Autism-spectrum disorder (ASD) is a common neurodevelopmental disorder characterised by communication and social difficulties, limited interest and repetitive and rigid behaviours. ASD is diagnosed according to the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) criteria (American Psychiatric Association, 2013). In recent years, the number of children diagnosed with ASD has increased dramatically (Maenner et al., 2020), including children under the age of two (Chawarska et al., 2007; Sacrey et al., 2015). As a result, there is a demand for therapeutic intervention considering that therapy should begin as early as possible (Wise et al., 2010).

Health-care systems face challenges when addressing the increasing prevalence of ASD. These include budget constraints, lack of skilled professionals with appropriate training, difficulties in allocating time for therapy and a tendency to cancel or avoid therapy sessions due to constraints related to the therapist or the patient. (Chiri & Warfield, 2011; Lavelle et al., 2014; Wise et al., 2010). Consequently, waiting times are increased, delaying diagnosis and the commencement of appropriate interventions (Miller et al., 2008). Occupational therapy is extensively used in children with ASD, addressing delays in fine motor skills (Lloyd et al., 2011), sensory regulation and sensory-based behaviours (Marco et al., 2011), attention, communication and adaptive behaviour (Chawarska et al., 2007; Paul et al., 2011; Rogers & Vismara, 2014; Ventola et al., 2011; Zwaigenbaum et al., 2009).

Several occupational therapy modes of interventions can be used in children with ASD including behaviourally based interventions (Fuentes et al., 2020), sensory integration therapies (Case-Smith et al., 2014) and the Developmental, Individual-differences and Relationship-based (DIR) method (Boshoff et al., 2020; Pajareya & Nopmaneejumrulers, 2011). Therapeutic preferences differ from centre to centre and are generally dictated by local experience; there is no consensus on the most effective modes of delivering interventions. In a recent meta-analysis on paediatric occupational therapies, applied behavioural analysis (ABA) was found beneficial based on high-quality evidence; sensory integration therapy was found ineffective; and DIR methodology had emerging evidence of weak positive effect on social and cognitive outcomes (Novak & Honan, 2019). Although there

Key Points for Occupational Therapy

- Group occupational therapy, using Developmental, Individual-differences and Relationship-based (DIR) model among toddlers with autism is feasible.
- DIR-based group occupational therapy reduced waiting time, allowed earlier intervention, without increasing staff burden.
- There were no significant differences between individual and group DIR-based occupational therapy outcomes.

are emerging data on improvements in socio-emotional development with DIR, this information is currently based on small number of research studies with insufficient evidence, and further research is needed (Boshoff et al., 2020).

Our centre's routine approach in individual occupational therapy for autistic children is based on the principles of the DIR model (Boshoff et al., 2020; Greenspan & Wieder, 1999; Pajareya & Nopmaneejumrulers, 2011). As reported by other health-care systems, we face challenges of long waiting times for services, thus delaying timely intervention.

In this study, we constructed a DIR-based group occupational therapy intervention as a means to improve accessibility and reduce waiting times without additional professional personnel or budget resources. Group therapy intervention offers the potential benefits of decreased waiting times and staff burden (Duncombe & Howe, 1995). Group occupational therapy is clinically used in day-to-day practice, as reported by 50% of 268 occupational therapist responding to a mail survey (Higgins et al., 2015). The application of group interventions for ASD children and adults is an emerging mode of treatment. Group-based social skills training programs had encouraging preliminary benefits for children and adults with ASD (Tanner et al., 2015), but additional research is needed. In a meta-analysis of individual versus group interventions for pre-school ASD children, both interventions have been found to be effective on reciprocity of social interaction toward others (Tachibana et al., 2018). Notwithstanding this, data on group occupational therapy interventions for toddlers with ASD are

limited, and further research is warranted (Higgins et al., 2015; Zwaigenbaum et al., 2015).

The rationale behind this research was to find avenues to deliver services faster. Our aims were to compare the outcomes related to intervention implementation and clinical outcomes of a group DIR-occupational therapy to those of individual DIR-occupational therapy interventions in toddlers diagnosed with ASD aged 2–4 years. We hypothesised that group occupational therapy for toddlers with ASD would be comparable to individual therapy.

2 | METHODS

2.1 | Participants

This study was conducted at the Institute for Child Development associated with Shamir Medical Center, Israel, from September 2018 to January 2020. It was approved by the Institutional Ethics Committee (MOH_2022-03-29_010703). The work was carried out in accordance with the ethical standards of the medical centre Ethics Committee for human experimentation, the Israeli Ministry of Health and with the Declaration of Helsinki as revised in 2000. Informed consent for study participation was provided by each toddler's parents prior to enrolling in the study.

In our centre, when ASD is suspected, the diagnostic sequence begins with an examination by a paediatric neurologist, followed by occupational therapist, speech therapist and psychological evaluations. This sequence, which encompasses approximately 3 to 4 months, is dictated by the availability of professional staff members.

After occupational therapy assessment, children will enter a waiting list for occupational therapy intervention. The intervention period lasts up to 6 months, after which children continue their treatments in community services or special education kindergartens, depending on their needs. In most cases, treatments will not provide simultaneously by two medical systems. Prior to initiation of group therapy as part of this study, the waiting list for individual occupational therapy was 9 months.

Potential participants for this study were toddlers suspected of having ASD as evaluated by a paediatric neurologist. Only toddlers who received a formal ASD diagnosis based on DSM-5 criteria from both a paediatric neurologist and later by a certified psychologist were included. Psychological evaluation was based on DSM-5 criteria, Mullen Scales of Early Learning (Shank, 2011) and Childhood Autism Rating Scale (CARS) questionnaire, second edition (Schopler et al., 1980). Toddlers were excluded from the study if their later psychological evaluation did

not suggest a diagnosis of ASD, in case they had visual and/or hearing impairments, or if they were admitted to a special education kindergarten during the study period (occupational therapy services are provided in the educational system).

2.2 | Study design

Potential participants who completed an occupational therapy assessment with a recommendation for intervention and were on a waiting list for therapy were randomised to individual or group therapy, initially at a 1:1 ratio. However, due to the long waiting times for individual therapy and hospital constraints, the allocation of 1:1 resulted in technical difficulties to commence groups of four children. Therefore, allocation was switched to 2:1 so that for each candidate for an individual occupational therapy session, two candidates were invited to group occupational therapy. The allocation was carried out by the main researcher who was blinded to the demographics and baseline data of the child. Toddlers who were not recruited to the study were offered the standard individual occupational therapy intervention.

Seven certified occupational therapists were involved in the study. Four completed a formal DIR course, and three were trained locally by the study principal investigator (SH). Therapists administered treatment sessions in both study arms and were randomly assigned to individual or group therapy. Prior to study initiation, the study PI thoroughly instructed all staff members regarding the room organisation, equipment, setting and mode of the clinical treatment. In order to assure that the treatment was conducted consistently and reliably, the study PI periodically observed the group or individual sessions.

Group occupational therapy comprised a series of 12 weekly sessions (intervention period) administered by two occupational therapists over 3 months. Up to four children were included in each group. Individual occupational therapy comprised 12 weekly sessions delivered by a single therapist. Individual therapy could last more than 3 months if sessions were cancelled or delayed by the participant's parents or therapist. In both interventions, each session lasted 45 min. Parental presence during the sessions was not mandatory, and all parents were informed and instructed after each session.

2.3 | Intervention method (group and individual)

In the current study, the content and structure of both individual and group interventions were based on the DIR

floor-time model (Greenspan & Wieder, 1999), focussing on the first three DIR stages of development: (1) sensory regulation, (2) intimacy and making contact and (3) two-way communication. The principles of the DIR-floor-time therapy session included tuning into the child's interest in activities while encouraging exploration and problem-solving, following cues of the child while giving meaning to each of the child's actions (planned, spontaneous or no action) and joining a mutual activity in a playfulness way, including preservative games, encouraging regulation and communication by using facial expression, tone of voice and affect or imitating the child's actions.

DIR is used in our institution by different professionals, such as psychologists, speech therapists and educators. In occupational therapy, we use the DIR floor-time methodology to promote the child's participation in daily activities, play and motor skills while addressing and responding to sensory regulation and communication difficulties. This 'face-to-face' mode of intervention consists of pre-planned, semi-spontaneous play sessions in which relationships are built, and functional capacities such as self-regulation, two-way communication, social and emotional engagement, complex thinking and problem-solving are developed.

2.3.1 | Group therapy

Room setting

The group sessions took place in a large room (30m²) that was systematically organised into experiential play stations by the therapists. On a table at the side of the room, we placed three transparent cylindrical containers with various threading elements inside and near them a basket with stickers. A barrel and a rocking bowl (<https://www.flaghouse.com/Motor-Skills/Balance/Rocking-Bowl-Clear.axd>) were placed on the floor in the middle of the room. On the other side of the room, we placed two storage boxes on a mattress, containing cars, dolls and utensils.

Basic strategies of intervention

The occupational therapists were instructed to sit near each station and avoid moving around in order to prevent emotional 'flooding' and to support the participants' regulation. The children were allowed to approach the play stations according to their own preference. To help the children to participate in play, the occupational therapist demonstrated games, for example, tossing balls into the barrel or threading beads from the containers, encouraging the children to join, yet allowing them to choose an activity of their own choice. Because there were up to four children in a group, each occupational therapist

played with one or two children at a time, whereas some children played on their own for up to 5 min, and then a therapist approached them. In certain instances, when the therapist noticed that a child was not interested in the stations, additional items were introduced including blocks, cons or scotch balls, depending on the cooperation and engagement in mutual activity.

2.4 | Individual intervention

Individual DIR interventions are our routine occupational therapy approach for autistic children. It is based on the same equipment and toys as described in group intervention, and the therapist used the same DIR floor-time methodology described above. The individual sessions took place in a room (15m²) that was systematically organised similarly as in group sessions, including a table at one side, a barrel, a rocking bowl on the floor in the middle of the room and mattresses on the other side of the room. Because of the individual nature, and in order to prevent overwhelming and emotional flooding, the number of items that were pre-organised in individual sessions were smaller than in the group session. The therapist sequentially introduced to the child 2–3 items at a time, using the same items of the group intervention, (not organised as play stations), allowing the child to choose an activity based on his own preference while encouraging him to join, cooperate and engage in mutual play.

2.5 | Data Collection

2.5.1 | Demographic data collection

Demographic and clinical data were collected for all study participants from the computerised hospital medical records. The parents' socioeconomic status was determined using the Hollingshead socioeconomic questionnaire (Hollingshead, 1975).

2.5.2 | Outcomes related to intervention implementation

We measured the following indices

1. Waiting days defined as the number of waiting days from the date of recommendation for occupational therapy to the beginning of participation in an individual or group session.
2. 'Nonattendance' defined as absence from a session for a variety of reasons, including bureaucratic failures in

obtaining funding from an insurer, lack of parking at the medical centre and family-related reasons such as the illness of a parent or child or difficulty obtaining time off work to attend the appointment.

3. Intervention period was defined as the duration (in weeks) of the individual therapy (group occupational therapy sessions took place regardless of cancellations, whereas cancellation of an individual session led to rescheduling the session until a total of 12 sessions took place).
4. Sessions attended were defined as the number of actual occupational therapy sessions attended by the child.
5. Response performance, defined as the number of ASD patients receiving occupational therapy treatments per number of total ASD patients, was collected from the hospital medical records in 2018 and 2019.
6. Staff burden of all therapists was evaluated using a self-reported work satisfaction questionnaire at the commencement of the study and 5 months after it ended. The 11 variables included satisfaction with working conditions, people in the environment and general satisfaction. The items were rated on a 7-point scale that ranged from 1 (*Very dissatisfied*) to 7 (*Very satisfied*), based on Bowling and Hammond (2008).

2.5.3 | Clinical outcome measures

The clinical outcomes were comprised of standardised outcome measures: adaptive behaviour, quality of life and fine motor skills and were evaluated at the first evaluation and after the end of the intervention.

To assess adaptive behaviour, we used the Adaptive Behaviour Assessment System (ABAS) questionnaire, which included the composite score of conceptual, practical and social functioning measurements and the total composite score (Harrison & Oakland, 2008). The participants' quality of life was assessed using the Paediatric Quality of Life Inventory (PDSQL) (Varni et al., 2001). Fine motor skills were evaluated by a certified occupational therapist using the Peabody Developmental Motor Scales Second Edition (PDMS-II) subtests numbers 5 and 6, which examined types of fine grips and visual-motor integration (Folio & Fewell, 2000). The occupational therapist was not blinded to the type of intervention.

The participants' parents were asked to complete the same questionnaire at two time points: before the start of occupational therapy and after the last treatment session. Percentage changes between baseline, and end of intervention was calculated. To maintain consistency, the same parent completed the questionnaires at both time points.

2.6 | Data analysis

Statistical analysis was performed using R version 3.6 (R Foundation for Statistical Computing, Vienna, Austria). Categorical variables were summarised using number and percentage and examined for statistical differences using Fisher's exact test. Continuous variables were summarised using mean and standard deviation and were examined for statistical differences using Wilcoxon's test for changes within each study group and the Mann-Whitney test for differences between groups. Changes in work satisfaction score were tested using a one sample *t*-test. Cohen's *d* effect size within each study group and between groups was calculated. A *p*-value <0.05 was considered statistically significant.

3 | RESULTS

A total of 60 toddlers with suspected ASD, undergoing ASD evaluation, were considered appropriate participants for the study and were randomly offered group or individual therapy in a ratio of 1:1. Ten of the families who were allocated to group therapy declined to participate: Three preferred individual therapy and expressed concern about the unfamiliar intervention model, and seven preferred occupational therapy treatment in the community. Among the 30 families allocated to individual therapy, 13 declined to participate because they preferred occupational therapy treatment in the community. The final study sample included 20 in group therapy and 17 in individual therapy. Among the 20 families who were allocated to group therapy, six were excluded: Three did not receive a formal ASD diagnosis by the psychologist at the end of the evaluation, and three began treatment in a special education kindergarten during the study. Additionally, four (28%) dropped out after 1–2 sessions; two felt uncomfortable seeing other ASD participants and asked for individual therapy. The other two families had difficulties attending appointments: one single parent and the other belonging to a minority group. Among the 17 families who were allocated to individual therapy, seven were excluded: One did not receive a formal ASD diagnosis by the psychologist at the end of the evaluation, and six began special education kindergarten. No dropouts occurred in those attending individual sessions.

Finally, 20 toddlers (group and individual therapy 10:10), mean age 2.2 ± 0.6 years (15 boys and five girls), met the inclusion criteria, completed the study and were included in the analysis. Figure 1 is a flow diagram of the study participants.

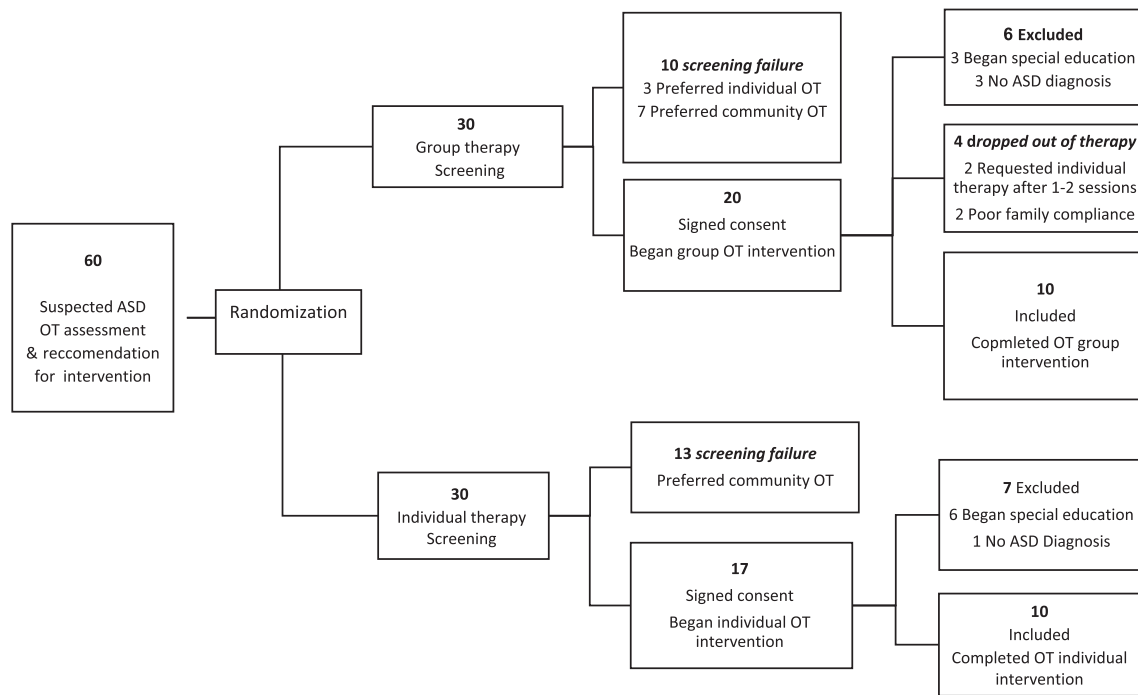


FIGURE 1 Study flow diagram.

Table 1 shows the demographic and baseline clinical characteristics of the participants. There was a mean of 2.2 ± 0.45 ($p > 0.05$) participants in each group session. No differences were found in demographic variables, Early learning composite and ASD severity (CARS score) between individual and group participants ($p > 0.05$). The parents were present at all individual therapy sessions, whereas in group therapy, a few parents chose to wait outside.

3.1 | Outcomes related to intervention implementation

Outcomes related to intervention implementation for group therapy compared to individual therapy are shown in Table 2. Participants waited fewer days to commence group compared to individual occupational therapy (52.4 ± 28.1 vs. 108.8 ± 48.0 days, $p < 0.01$). The mean number of nonattendance was similar in both interventions (3.2 ± 2.82 vs. 2 ± 1.76 , $p > 0.05$). The group intervention period was limited to 12 weeks, whereas individual therapy was significantly longer (16.4 ± 3.56 weeks, $p < 0.001$). Participants in individual occupational therapy attended more sessions compared to children in group therapy (11.33 ± 1.5 vs. 7.17 ± 3.84 , $p < 0.001$).

In the year prior to this study initiation (2018), only 12 (17%) of all 69 toddlers diagnosed with ASD received

occupational therapy treatments in our centre. During the study period (year 2019), the response performance increased to 37% (34 out of 91 children diagnosed with autism).

No differences were found between therapists' work satisfaction scores at the beginning of the study and 5 months thereafter (6.1 ± 0.4 vs. 6.07 ± 0.49 , $p > 0.05$).

3.2 | Clinical outcome

The clinical outcomes of both group and individual occupational therapy at the end of the study are shown in Table 3. There were no significant differences between baseline and follow-up outcomes within both group and individual therapy. In addition, there were no significant differences in percentage changes between individual and group therapy outcomes for adaptive score (6.0 ± 16.0 vs. 4.5 ± 17.9 , $p > 0.05$), quality of life, (1.3 ± 20.9 vs. 18.8 ± 24.4 , $p > 0.05$) and fine motor skills (13.7 ± 36.1 vs. 15.1 ± 41.5 , $p > 0.05$).

4 | DISCUSSION

This prospective pilot study aims to address the gap between high demand for occupational therapy for children with ASD and limited health resources by exploring the effectiveness of group versus individual occupational

TABLE 1 Clinical and demographic baseline characteristics of the study population.

| Variable | Entire study population N = 20 | Group OT N = 10 | Individual OT N = 10 | p-Value |
|---|-----------------------------------|--------------------|-------------------------|---------|
| Female: Male | 5:15 | 2:8 | 3:7 | 1.000 |
| Gestational age (weeks) | 40 (34–42) | 39.5 (36–42) | 40 (34–41) | 0.908 |
| Birth weight (g) | 3202 (1950–4350) | 3312 (2665–4145) | 2956 (1950–4350) | 0.241 |
| Age at enrolment (years) | 2.2 (0.52–3.3) | 2.3 (1.8–2.7) | 2.2 (0.52–3.3) | 0.684 |
| Number of children in the family | 2 (1–4) | 2 (1–3) | 2 (1–4) | 0.780 |
| Early learning composite | 52 (49–73) | 56.5 (49–67) | 50 (49–73) | 0.847 |
| Severity of ASD (CARS score) | 35.8 (29–45) | 34.8 (33–38) | 37.8 (29–45) | 0.196 |
| Hollingshead index socioeconomic score | 30.8 (20.5–60.5) | 30.8 (20.5–45) | 35.2 (20.5–60.5) | 0.404 |
| Maternal education (years) ^a | 12 (10–17) | 12 (10–12) | 12 (11–17) | 0.196 |
| Paternal education (years) ^b | 12 (10–15) | 12 (12–14) | 12 (10–15) | 0.590 |

Note: Categorical variables are presented as number and percentage, continuous variables are presented as number \pm standard deviation. Early learning composite is derived from the Mullen Scales of Early Learning.

Abbreviations: CARS, Childhood Autism Rating Scale; OT, occupational therapy.

^aN = 18;

^bN = 17.

TABLE 2 Outcomes related to intervention implementation. Group therapy compared to individual therapy.

| Administrative indices | Group therapy (n = 10) \pm SD | Individual therapy (n = 10) mean \pm SD | p-Value |
|----------------------------|---------------------------------|---|---------|
| Waiting days | 52.4 \pm 28.1 | 108.8 \pm 48.0 | 0.006 |
| Nonattendance | 3.2 \pm 2.82 | 2 \pm 1.76 | 0.420 |
| Intervention period, weeks | 12 \pm 0 | 16.4 \pm 3.56 | <0.001 |
| Sessions attended | 7.17 \pm 3.84 | 11.33 \pm 1.5 | <0.001 |

Abbreviation: SD, standard deviation.

therapy interventions using the same DIR floor-time therapy. We found that implementation of group therapy among toddlers with ASD is feasible and reduced waiting time, thus, allowing for earlier intervention without increasing staff burden. Clinical improvement within and between the group and individual intervention was similar, however not statistically significant, suggesting that quality of care of group and individual therapy were comparable.

Occupational therapy is commonly used in ASD toddlers to address fine motor, sensory, adaptive behaviour skills and participation in social play and leisure pursuits. However, robust evidence supporting these interventions is still lacking, and there are no guidelines for effective methods of intervention (Tanner et al., 2015).

The concept of group therapy is increasingly recognised, due to the shortage of trained therapists and pressure to accept more patients (Camden et al., 2013; Duncombe & Howe, 1995). Due to communication and behavioural difficulties, group therapy for individuals with ASD may be challenging (Kerns et al., 2020; Lainhart, 1999; Sacrey et al., 2015). Group-based social skills training programs are considered effective for

children and adults with ASD (Tanner et al., 2015). However, reports on group therapy in ASD toddlers and in particular group occupational therapy are limited (Higgins et al., 2015; Tanner et al., 2015; Zwaigenbaum et al., 2015).

The current study was conducted in a public medical centre. It provided short-term group therapy using existing resources without additional treatment hours, manpower or funding. We found that group occupational therapy had a better managerial outcome over individual occupational therapy. Reducing the waiting time for therapy allowed the beginning of an early intervention, so that more children were able to receive occupational therapy without compromising the quality of care. Our finding is consistent with prior reports suggesting that group therapy enabled shorter waiting times allowing intervention to begin at an earlier age in order to anticipate a better treatment outcome (Gordon-Lipkin et al., 2016; Zwaigenbaum et al., 2015).

Toddlers allocated to individual intervention attended more sessions, compared to group therapy, as a new appointment was given in case of cancellation. Limiting the group intervention to a short term of 12 weeks was

TABLE 3 Change in clinical parameters following the intervention.

| Clinical characteristics | Group OT (n = 10) mean ± SD | | | Individual OT (n = 10) mean ± SD | | | Cohen's effect size | p-Value individual vs. group (% change) | Cohen's effect size | |
|--|-----------------------------|---------------------|-------------------------|----------------------------------|---------------------|-------------------------|---------------------|---|---------------------|-------|
| | Baseline | End of intervention | % change (p-value) | Baseline | End of intervention | % change (p-value) | | | | |
| Adaptive Behaviour Assessment System (ABAS) | | | | | | | | | | |
| Total score composite | 70.0 ± 8.6 | 73.7 ± 13.2 | 6.0 ± 16.0 (p = 0.357) | 65.0 ± 13.6 | 67.6 ± 16.3 | 4.5 ± 17.9 (p = 0.858) | 0.375 | 0.80 | 0.25 | -0.13 |
| Concept composite | 77.5 ± 12.2 | 78.0 ± 13.4 | 1.6 ± 13.3 (p = 0.683) | 68.7 ± 18.5 | 72.5 ± 18.4 | 7.2 ± 21.2 (p = 0.349) | 0.12 | 0.9 | 0.34 | 0.26 |
| Social composite | 74.7 ± 7.6 | 76.1 ± 14.4 | 1.9 ± 16.3 (p = 1) | 67.7 ± 13.8 | 64.7 ± 12.1 | -3.2 ± 15.1 (p = 0.233) | 0.11 | 0.45 | -0.21 | 0.39 |
| Practical composite | 70.2 ± 9.2 | 74.7 ± 11.6 | 7.3 ± 16.8 (p = 0.26) | 68.1 ± 11.6 | 69.9 ± 14.4 | 3 ± 15.4 (p = 0.635) | 0.44 | 0.57 | 0.19 | 0.25 |
| Quality of life (PDSQL) | 66 ± 19.1 | 65 ± 15.5 | 1.3 ± 20.96 (p = 0.845) | 57 ± 12.0 | 60.4 ± 19.6 | 18.8 ± 24.5 (p = 0.074) | 0.06 | 0.19 | 0.76 | 0.76 |
| Fine motor skills (PDMS-2) | 78.0 ± 16.1 | 82.3 ± 9.3 | 13.7 ± 36.1 (p = 0.359) | 67.0 ± 22.0 | 73.5 ± 21.5 | 15.1 ± 41.5 (p = 0.247) | 0.38 | 1.00 | 0.36 | 0.04 |

Abbreviations: ABAS, Adaptive Behaviour Assessment System; OT, occupational therapy; PDMS-2, Peabody Developmental Motor Scale 2nd edition; PDSQL, Paediatric Quality of Life; SD, standard deviation.

an additional factor that allowed us to reach more patients during a given period, without the need for additional hours, economic or human resources.

Both interventions had a similar number of session cancellations during the study (nonattendance). Cancellation of sessions are common in the public health system and are detrimental to the patient and the system due to negative effects on human resource utilisation, which may result in reduced quality of service (Macharia, 1992).

Dropout from intervention for reasons unrelated to attending special education kindergarten was observed only in the group therapy arm. All families who dropped out of group occupational therapy were struggling with personal challenges and were single mothers, from a minority group or families facing difficulties in daily life as well as challenges in meeting the needs of their child's developmental delay. Our findings are consistent with other reports suggesting that dropping out from therapy may be related to socio-demographic and familial parameters (Campbell et al., 2000; Kazdin et al., 1997). Other factors, such as parental criticism of reduced staff attention during group sessions, should be investigated in future studies as potential modulators of drop out.

Higher workload, team burnout and particularly inadequate professional training among caregivers in public health systems attribute to the therapeutic burden of caring for children with ASD (Brookman-Frazer et al., 2011). We reported no change in staff burden due to group therapy over the study period as measured by therapists' high satisfaction. The group therapy model used in this study included two occupational therapists per session, which facilitated teamwork, shared knowledge and training and peer support, while providing a joint care intervention.

This pilot study used a systematic individual versus group occupational therapy for toddlers with ASD based on the DIR strategy, utilising the flexibility of the floor-time method as a child-oriented approach. We found that clinical improvement in quality of life, adaptive personal and social behaviour and fine motor skills of both group and individual interventions was similar and not statistically significant between both study arms.

In comparison to our finding, a recent study showed that ASD toddlers can benefit from social communication intervention among pairs of ASD toddlers in a supported play setting (Shire et al., 2020). We were not able to prove a significant clinical benefit in both study arms, perhaps because of the small sample size and the short intervention period of 12 weeks. The design of future trials should include longer periods of intervention.

Studies on group occupational therapy interventions for toddlers with ASD using developmental progress, quality of life and adaptive behaviour are limited

(Tachibana et al., 2018). Iwanaga and co-workers studied pre-schoolers with ASD (mean age 4.8 years) and found that individual sensory integration occupational therapy was more effective than group occupational therapy that focussed on social communication, kinetic activities and child-parent play, for 8–10 months (Iwanaga et al., 2013). However, their data may not be comparable to ours because our study design compared a different therapy model (DIR model) applied to both individual and group arms, in a younger age group (toddlers, mean age, 2.2 years) and for a shorter period.

5 | LIMITATIONS

This study had several limitations. The effect of changing the therapy allocation ratio from 1:1 to 1:2 could potentially have influenced our results, yet this effect was probably negligible because the long waiting times to individual therapy was a major obstacle to enter the group session and given the increase in response performance during the study period.

In addition, the occupational therapist who evaluated the participants for fine motor skills was not blinded to the intervention type. Future studies should include blinded evaluators. The sample size was relatively small reflecting difficulties in recruiting children with ASD and their families to interventional studies. Also, the group intervention was limited to 12 weeks; therefore, additional studies with longer intervention periods and larger cohorts are needed to confirm the findings. No reliable validated measures for sensory regulation and coping were utilised in the current study; in future studies sensory measures should be used. As no health economic evaluation was undertaken, further research is needed to evaluate cost-effectiveness of group occupational therapy. Additionally, our study design did not meet all treatment fidelity strategies (Bellg et al., 2004), and therefore, its results should be treated with caution.

The main strength of the study was the implementation of an early innovative DIR group occupational therapy intervention model for toddlers diagnosed with ASD, who are rarely offered group intervention. The therapy started early, during ASD evaluation, within the framework of the public health system.

6 | IMPLICATIONS

Given the increasing demand to provide diagnosis and treatment for children with ASD, the health system should be prepared to find appropriate solutions while preserving individual children's achievements. This pilot

study examined outcomes related to intervention implementation and clinical outcomes of group occupational therapy for toddlers with ASD compared to individual therapy. Group and individual intervention were based on the principles of the DIR model. Our findings revealed that provision of group occupational therapy among toddlers with ASD is feasible and may be justified in a public health system with no clinical inferiority to individual therapy. Group therapy could serve as a bridge until the beginning of individual intervention or until entry to a special education system. A mixed model of alternating individual and group therapies could also be considered. More research is recommended evaluating whether group occupational therapy is justified both clinically and as a tool to improve accessibility to services. This study should serve as a basis for a large, randomised control trials of group versus individual occupational therapy interventions in toddlers diagnosed with autism.

AUTHOR CONTRIBUTIONS

Sivan Hirschmann: Conceptualization; methodology; investigation; project administration; resources; data curation; writing—original draft; writing—review and editing. **Racheli Magnezi:** Conceptualization; visualization. **Haim Bassan:** Conceptualization; methodology; data curation; validation; investigation; resources; writing—original draft; writing—review and editing; visualization; project administration and supervision. **Orna Tal:** Conceptualization; methodology; writing—original draft; writing—review and editing; project administration and supervision.

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CONFLICT OF INTEREST

The authors have no conflicts of interest to declare.

DATA AVAILABILITY STATEMENT

The data underlying this article cannot be shared publicly due to the privacy of the individuals who participated in the study.

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