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Introduction

The first issue of the second volume of the journal *Mediated Learning Experience: International Practices and Advances*, with its three comprehensive articles, addresses the application of Feuerstein's Theory of Structural Cognitive Modifiability in promoting individuals with special needs.

The first article, authored by Prof. Hefziba Lifshitz from Bar-Ilan University and her colleagues, summarizes an ambitious and innovative project in which 12 men and women with intellectual disabilities completed an actual undergraduate degree at Bar-Ilan University. This is an inspiring achievement that demonstrates how far the boundaries of human potential or as Reuven Feuerstein referred to it 'the propensity for change.' can be stretched., The project was accompanied by an in-depth and comprehensive study, the results of which are presented in this article, indicating that both fluid and crystallized intelligence are modifiable.

The second article, written by Dr. Sari Alony, who for many years directed the Child Clinic at the Feuerstein Institute, outlines a working model in the complex field of parent guidance for children on the autistic spectrum. The article is based on case studies and demonstrates how the family environment can be transformed into an 'active modifying environment' and how the principles of mediated learning can be integrated into everyday life. The significance of this article lies in its ability to extend treatment beyond the confines of the therapy room into the child's natural environment.

The third and final article, authored by Prof. (Emeritus) David Tzuriel from Bar-Ilan University and his colleagues, examines the changes observed in a child on the autistic spectrum, based on changes in mediated learning experience interaction.

All three articles continue the general theme of the journal, which aims to bridge the gap between academic research and real-world practice in order to enrich and empower therapists, teachers, parents, and researchers who adopt or are interested in Feuerstein's paradigm.

My gratitude and appreciation to Prof. Alex Kozulin, Chair of the Editorial Board, the distinguished members of the Editorial Board who accompany this journal, and all those who contributed to the publication of this journal.

Refael S. Feuerstein

The Impact of Postsecondary University Education on Crystalized and Fluid Intelligence of Students with Intellectual Disability: Nonparametric analysis

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The authors express their deep appreciation to the 12 students with intellectual disability who amaze and inspire every day with their growth, sprouting, persistence, and courage.

Abstract

Goal: To examine crystallized and fluid intelligence and cognitive abilities of 12 adults with mild intellectual disability who participated in postsecondary education (PSE) over 4.5 years. ***Method:*** The sample included six adult students in adapted PSE "enrichment" courses and six adult students who were integrated in undergraduate courses with typical students towards receiving a BA degree (hereinafter: the partial BA model). The WAIS-III and Hebrew cognitive battery was administered twice: at time 1 and 4.5 years later. ***Results:*** Wilcoxon analysis revealed improvement in the enrichment and the partial BA model groups. Greater improvement was found in crystallized than in fluid intelligence measures. The partial BA group showed significant gains in more tested domains. At follow-up, their general IQ (75-91) and crystallized (verbal) IQ exceeded the diagnostic cutoff for mild intellectual disability (72-95). For fluid intelligence, the scores of one student in the enrichment group exceeded the diagnostic cutoff for intellectual disability (77). Fisher exact tests revealed a Matthew effect for four students in the partial BA group and an equalizer effect for one student in the enrichment group. ***Conclusions:*** Despite the small sample size, findings extend empirical research on PSE's impact on intelligence and cognitive abilities of adult students with intellectual disability.

Keywords: postsecondary academic education, adults with intellectual disability, adapted enrichment courses, undergraduate curses partial BA model, crystallized/fluid intelligence

The Impact of Postsecondary University Education on Crystalized and Fluid Intelligence of Students with Intellectual Disability: Nonparametric analysis

Postsecondary education (PSE) for adults with intellectual disability is expanding around the world (Lee & Taylor, 2022). However, research to date on PSE students with intellectual disability focused mainly on their social experiences (National Down Syndrome Society, 2021; Uditsky & Hugson, 2012); on lecturers' and stakeholder groups' attitudes (Alqazlan et al., 2019; Carter et al., 2019; Grigal et al., 2019); and on PSE's impact on students' employment and families (Machado et al., 2021). Lee and Taylor (2022) reviewed the benefit of PSE programs for students with ID. Ryan et al. (2019) found improvement in independent living skills (hygiene, laundry, cooking, paying bills) after completing PSE programs in Australia. Positive employment outcomes after completing a PSE program were expressed by higher employment rates, employment positions, hours, and wages. Improvement was found in self-esteem, self-determination, self-confidence, and social participation among PSE students with intellectual disability in Ireland (Spassiani et al., 2017). The students reported on their self-perceived intellectual and learning growth following PSE programs (Corby et al., 2020).

Very few PSE programs report full inclusion of students with intellectual disability, and few students have successfully completed bachelor's degrees (e.g., Iwamoto, 2005; Pineda, 2020). However, systematic empirical research is needed to compare the effectiveness of full inclusion versus other PSE models using standard measures of intelligence and cognition (Duke et al., 2017). For individuals with typical development, scientists have explored environmental resources such as education as related to intelligence and cognitive abilities (Ackerman, 2000; Ziegler et al., 2012), whereas such research on education's effects is under-investigated for populations with intellectual disability. Thus, the current longitudinal study compared adults with intellectual disability who studied in two university-based PSE models – adapted

"enrichment" courses versus full inclusion in undergraduate course – for programs' contribution to the adult PSE students' crystallized and fluid intelligence and cognitive abilities.

Effects of Education on Students' Intelligence and Cognitive Abilities

For the general population, Ritchie and Tucker-Drob's (2018) meta-analysis of quasi-experimental studies clearly showed positive education effects on crystallized, fluid, and general intelligence. Longitudinal studies showed that longer educational duration correlated with increased intelligence test scores. Ritchie and Tucker-Drob postulated that education quality acts as the mechanism underlying this effect (Allensworth et al., 2017). For example, high-quality learning strategies for increasing intelligence included teaching material directly relevant to tests, training in abstract reasoning, and enhancing concentration and self-control skills.

Some research on education effects for the general population demonstrated a *Matthew effect* (Duff et al., 2015; Stanovich, 1986). The Matthew effect refers to a pattern in which those who begin with advantage, i.e. exhibit a higher initial cognitive level, accumulate more achievements over time than individuals with a lower initial intelligence (Kyröläinen & Kuperman, 2021). Other studies found an opposite effect, in which education acts as an *equalizer*, where children with initial lower intelligence benefit most from education (e.g., Downey et al., 2004).

To better understand education effects on IQ in the general population, Haier (2014) underscored the importance of examining pre-post changes in intelligence scores not only at the group (macro) level, but also at the individual (micro) level. Schneider et al. (2014) examined IQ trajectories from preschool to early adulthood for typically developing individuals with low, average, or high mean IQs. At the macro level, lower IQ groups exhibited stability over time, and the initial high-IQ group maintained its advantage, demonstrating a Matthew effect. However, at the micro level, 12 of those with an initial low IQ eventually attended advanced

high-school tracks, and 9 graduated from university, indicating equalizer effects.

Some research found that university study correlated with fluid intelligence (Kyröläinen & Kuperman, 2021). Fluid intelligence (Kaufman, 2001) refers to deliberate mental problem-solving operations and is sometimes measured as performance IQ. It is considered a "vulnerable" ability, peaking in the early 20s in the typical population and then declining (Góngora et al., 2020; Kaufman, 2001). University degree completion was found to correlate with higher midlife fluid intelligence, beyond earlier intelligence scores collected during adolescence (Clouston et al., 2012). Other researchers reported education effects on crystallized knowledge such as verbal memory, fluency, and vocabulary (Moehring et al., 2018). Crystallized intelligence (Kaufman, 2001) refers to acquired cultural and linguistic knowledge and is sometimes measured as verbal IQ. It is considered a "maintained" ability that increases into one's sixties and seventies in the general population and then declines (Góngora et al., 2020; Kaufman, 2001). Ackerman (2000) found that more advanced academic degrees correlated more strongly with crystallized intelligence, but this was non-significant for fluid intelligence. Crystallized intelligence predicted knowledge in social sciences, whereas fluid intelligence predicted knowledge in exact sciences.

Contrary to typical populations, research on education effects for adults with intellectual disability regarding a range of aspects is scarce: education amount versus quality; initial baseline intelligence's impact on students' growth following education; macro versus micro effects; and education's differential effects on crystallized versus fluid intelligence and cognitive abilities. Lifshitz et al.'s (2016) study on higher education's effects on the cognitive abilities of 29 PSE students with intellectual disability found that participation in a university-based adapted "enrichment" model contributed 11-19% of the variance in students' crystallized intelligence scores and 16-47% of the variance in their fluid intelligence scores.

Other research on systematic mediational intervention for adults with moderate intellectual disability (Lifshitz & Rand, 1999; Lifshitz et al., 2011) reported pre-to-post improvement in crystallized cognitive abilities but did not examine intelligence. Studies (Chen et al., 2017; Lifshitz et al., 2021) found higher crystallized intelligence scores among adults compared to adolescents with and without down syndrome having the same cognitive level, indicating growth of crystallized intelligence into adulthood. However, these studies did not examine PSE effects. Research in a population with intellectual disability reported equalizer effects, where lower functioning individuals with moderate intellectual disability improved more than those with mild intellectual disability in logical thinking and spatial orientation (Lifshitz & Rand, 1999) and analogical reasoning (Lifshitz et al., 2011).

Current Study's PSE Models for Students with Intellectual Disability

This study compared two inclusion models for adults with mild intellectual disability: "enrichment" and inclusion into uder graduate course (here after "partial BA model)." Both models operated within the same multi-model university-based Empowerment Project for PSE inclusion of adults with intellectual disability, derived from United Nations (2006) inclusive education agendas. Both were anchored in theories conceptualizing potential for cognitive growth and compensation in adults with intellectual disability: the Compensation Age Theory (Lifshitz, 2020; Lifshitz-Vahav, 2015), the Structural Cognitive Modifiability Theory (Feuerstein, 2003), and the Cognitive Reserve Theory (Stern, 2012).

The current study compared two of these inclusion models for adults with mild ID – the "enrichment" model and the "partial BA" model. As seen in Table 1, both models delivered academic material over the same duration in university social sciences faculties with mediation/support from trained special educators (academic facilitator), but differed in frequency, structure, mediating agents, super-goals and sub-goals, learning strategies, and earned certification (Table 1; Lifshitz, 2020). Overall, the "enrichment" PSE model included

weekly participation in adapted separate academic courses or hybrid inclusive courses, exposing students with ID to concrete, specifically selected academic material relevant to their world for purposes of academic and social enrichment, without any academic obligations such as reading articles/textbooks, fulfilling assignments, or taking exams. In contradistinction, the “partial BA model" was based on full inclusion in undergraduate courses, accumulating credits toward the BA degree and meeting all academic obligations, entailing standard coursework, homework, and exams with appropriate accommodations.

This longitudinal study examining 12 adult PSE students with mild intellectual disability (6 “enrichment” and 6 “partial BA model” students) investigated their improvements in crystallized and fluid intelligence and cognitive abilities following 4.5 years of project participation. Baseline assessments conducted previously at Time 1 (see Lifshitz et al., 2018) were repeated in the current study (Time 2) to follow up on students’ intelligence and cognitive abilities after 4.5 years of “enrichment” or “partial BA model” participation. Complementary macro and micro analyses compared the two groups, which differed in their baseline intelligence levels at the macro level (Lifshitz et al., 2018). Three research hypotheses were formulated:

Hypothesis 1: Education "Effects" – Pretest versus Posttest. We hypothesized that students with intellectual disability in both PSE programs would be able to capitalize significantly on their PSE participation. Based on the literature above, improvement from Time 1 to Time 2 was predicted for their *general IQ* scores and their *crystallized measures*. No prediction was made for pre-post improvement on *fluid intelligence measures* due to mixed prior results on education effects for typical populations and a paucity of research on intellectual disability.

Hypothesis 2: Academic Degree “Effects” on Enrichment - Partial BA Model. We hypothesized that the partial BA model group, who participated in education with more demanding academic sub-goals (see Table 1), would achieve significant improvement at Time 2

in a greater number of *crystallized measures* compared to the enrichment group. We did not predict a direction for group differences in improvement on *fluid intelligence measures* due to previous mixed research outcomes on the general population and on fluid intelligence growth from adolescence to adulthood among adults with intellectual disability.

Hypothesis 3: Education "Effects" – Micro-Level Matthew versus Equalizer Effects. We hypothesized **a** Matthew effect indicating larger pre-post improvements on *general* and *crystallized* intelligence measures among individual students with higher baseline intelligence (partial BA model) compared to counterparts with lower baseline intelligence (enrichment). No prediction was made for micro-level pre-post improvement for *fluid intelligence measures* due to insufficient prior research on PSE effects for subgroups of adults with mild intellectual disability levels.

Method

Participants

The participants included 12 adults with mild intellectual disability aged 25-51 years at baseline (29-55 at follow-up): 6 enrichment/hybrid students and 6 partial BA model students (see Table 2). Inclusion criteria in this follow-up study were: completion of Time 1 baseline assessments (Lifshitz et al., 2018) after two years of participation in the Empowerment Project; continuation in the assigned PSE model for another 4.5-year period; and completion of follow-up assessments at Time 2. At baseline, participants were diagnosed with mild intellectual disability according to *DSM-5* classifications of general IQ<75 (American Psychiatric Association [APA], 2013).

Wilcoxon tests at Time 1 showed that those admitted to the partial BA model group significantly outperformed those who remained in the enrichment group on general IQ (Z=.2.89, p=.004) and verbal IQ (Z=0.00, p=.002). No significant group differences emerged at Time 1

for performance IQ (Z=1.53, $p>.05$). The partial BA model group was comprised of four women and two men, while the enrichment group included three women and three men (Table 2), with no significant age difference between groups, $U=8.00$, $p=.132$. The partial BA model students showed diverse etiologies, whereas four of the six enrichment students had a non-specific etiology. In the partial BA model group, Student E had a physical disability, and Student C developed emotional problems and began pharmacological treatment near the end of the 4.5 years. In the enrichment group, Student I had emotional problems.

Enrichment students worked mornings in vocational centers or various workplaces, attended PSE enrichment courses twice weekly, and attended afternoon leisure activities. Partial BA model students attended university courses twice weekly and worked the other three days. In each group, half of students lived in community residences for adults with intellectual disability and half lived at home with parents.

The empowerment PSE program

This section relates to the role of academic facilitators, mediational strategies, criteria for choosing the undergraduate courses, criteria of success in the inclusive models.

Role of the academic facilitators: The students in both models were accompanied by academic facilitators. In line with the Cognitive Modifiability theory and the Mediated Learning Experience (SCM-MLE, Feuerstein et al., 1979a; Feuerstein, 1990, 2003), the academic facilitators (graduates of the MA program in ID) serve as mediators (Human) between the academic material (Stimula) and students with intellectual disability (Organism). They received the curriculum and content from the lecturers before the course. They prepared a reader for each course, which included relevant reading materials. The mediation to the six BA students with intellectual disability was given as a team. Additional tailored mediation was given according to individual needs of the six students. In the BA partial BA model, the academic facilitators accompanied the six students with

ID during the regular courses themselves, and for each hour of the university courses, the academic facilitator give the students an additional academic hour of mediation (they also accompanied the students in exams, see below) .

Mediational strategies: The academic facilitators adapted and adjusted the academic material using three key strategies: The Universal Design of Learning (UDL, Israel, 2010), the new Bloom taxonomy (Forehead, 2010) and language simplification (Department of Health, 2020). UDL provides three main principles for learning: (a) Multiple means of representation, aiming to promote resourceful, knowledgeable students and to strengthen comprehension, language, perception, expression and communication which represents verbal-crystallized skills. The academic facilitators work with the students on reading comprehension (identification of titles, new words, key words, distinguishing between principal and secondary ideas, asking and answering questions). For simplification of the academic texts, we used Easy-to-Read principles for making written information easier to understand for people with learning disabilities (Inclusion Europe, 2021). (b) Multiple means of action aiming to promote strategic, goal-directed students, strengthening working and long-term memory and executive function, and self-regulation which represents fluid skills. Bloom's taxonomy (Forehand, 2010) is also used, with adaptation to populations with intellectual disability. The academic materials (texts, PowerPoint presentations) were analyzed for remembering, comprehension, application, analysis, synthesis, and evaluation. (c) Means of engagement, strengthening motivation and persistence and coping resources.

Criteria for choosing the undergraduate courses: The project's pedagogical committee chose courses from the social sciences which are based on verbal knowledge and have content relevant to the world of adults with intellectual disability: Introduction to Special Education, Intellectual Disability, Computer Programming for Special Needs, Informal Education, Judaism. The courses deal with special and informal education, the rationale and values of leisure activities, the residence framework for individuals with disabilities, Jewish humanistic values and their

implications for everyday life which strengthen their self-efficacy to cope with these courses. Then they took courses in other departments: Mass Communication, Sociology, Art, etc. They participated in the course actively and shared their life experience as persons with disability. The lecturers of these courses received explanations about persons with intellectual disability, but our instruction was to teach the courses as usual without accommodation.

Criteria of success in the inclusive models: In the *inclusive adapted requirements model*: fulfilling basic academic requirements. Fulfilling the requirements was a criterion of success. In some courses of the *inclusive full requirements model*, the final score is determined by exams and in some, by course tasks. The criteria required of the students with intellectual disability were the same as those required from the students with typical development. In Israel, exam scores range between 0-100, with a passing score of 60. Some of the exams are multiple-choice, which are difficult for students with intellectual disability. In this case, our students received an accommodation that was approved by the Social Engagement Department at the university which is given to students with other types of disabilities: The six students received the same exams (typical students received different questionnaires in which the questions are mixed). The academic facilitator read each question aloud separately, and the students marked the correct answer on their sheets (without help). The facilitator then moved to the next question.

In courses in which there were no exams, the final score is comprised of course assignments. Course work scores are comprised of strict criteria of expressive writing ability, using scientific terms, and reading academic articles. The same criteria are used for the students with intellectual disability. The scores ranged between 60-80. The students have so far earned 32 academic credits.

Measures

Crystallized and Fluid Intelligence. The WAIS-III^{HEB} (Wechsler, 2001, Hebrew version) was utilized at both intervals to assess participants' full IQ and verbal/performance IQ scales.

Crystallized and Fluid Hebrew Cognitive Abilities. For a battery of Hebrew cognitive tests administered at Time 1 (Lifshitz et al., 2018), confirmatory factor analysis (CFA, varimax rotation, minimum loading set-point: .35) confirmed a crystallized cluster and a fluid cluster (inter-rater reliability of 90% between three raters per McGrew, 2009). Both test clusters were repeated at Time 2.

The crystallized cluster (41.39% of CFA variance) included four tests: semantic-fluency (Kave, 2006) and synonyms, classification, and contrasts tests from MANN Abstract Verbal Thinking Test (Glanz, 1989). Students received 1 point for each correct answer in all crystallized tests. The *semantic-fluency* test (Kave, 2006) summed the words that students generated, in one minute, for three semantic categories: animals, fruits, and vegetables (test-retest reliability=.86). The 12-item *synonyms* test (Glanz, 1989; test-retest reliability=.90; α=.91) asked students to find a word similar to a given key word (e.g., wall), from a 5-word list (e.g., gate, path, way, balcony, side). The 12-item *classification* test (Glanz, 1989; α=.72) presented four words and asked students to find the single concept/trait best characterizing them. The 12-item *contrasts* test (Glanz, 1989; α=.82) presented a word and asked students to find its opposite from among five alternatives.

The fluid cluster (37.59% of CFA variance) included four tests: phonemic-fluency (Kave, 2006), verbal analogies (MANN, Glanz, 1989), Homophone Meaning Generation Test (HMGT, Mashal & Kasirer, 2011), and idiom comprehension (Mashal & Kasirer, 2011). Students received 1 point for each correct answer in all fluid tests. The culturally unbiased nonverbal *phonemic-fluency* test (Kave, 2006; α=.91) required students to address novelty (Kaufman, 2001). Students were instructed to say as many Hebrew words as possible, in one minute,

beginning with each of three letters. Total words were summed. The 12-item *verbal analogies* test (Glanz, 1989; α=.80) presented a full word-pair relationship and another partial analogous word-pair to fill in the blank from five alternatives. The 10-item *HMGT* (Mashal & Kasirer, 2011; α=.83) asked students to say all meanings of each homophone. The 20-item *intellectual disability comprehension* test (Mashal & Kasirer, 2011; α=.71) on idioms' figurative meanings asked students to choose the correct idiomatic interpretation out of four options.

Procedure

Ethical Procedures. Authorizations were obtained from the university Faculty of Education Ethics Committee and the Israeli Ministry of Welfare's Disability Division. Participants' parents/guardians signed written consents. Students with intellectual disability signed easy-to-read consents. We orally clarified that there was no obligation to participate. Typical students received payment for their participation in the research. Per the normalization principle (Wolfensberger, 2022), all participants with intellectual disability chose a gift or payment for their participation.

Data Collection at Time 2. WAIS-III^{HEB} testing was administered individually (~90 min) by the Chief Psychologist of the Ministry of Welfare's Disability Division. Crystallized and fluid batteries were administered individually by master's students specializing in intellectual disability, during two consecutive ~60 min sessions with a 15-min break.

Data Analysis

Prior to examining research hypotheses, Shapiro-Wilk tests showed some dependent variables in each group with an abnormal distribution (p<.05). All hypotheses were therefore examined by nonparametric analyses. Kendall tau coefficients, calculated to investigate links between students' chronological age and WAIS-III scores, revealed non-significant findings at both intervals (p>.05). Further analyses were thus conducted without examining students' ages.

For Hypotheses 1 and 2, Wilcoxon analyses traced pre-post improvement on students' general, crystallized, and fluid measures in each PSE group by subtracting Time 1 scores from Time 2 scores. To further examine Hypothesis 2 on academic degree, we calculated point-biserial Kendall tau rank correlations between academic program (entered as a dichotomous variable: partial BA model=1, enrichment=0) and students' crystallized and fluid scores at both intervals. Kendall's τ coefficient measured ordinal association and statistical dependence between these two measured quantities.

For Hypothesis 3 investigating possible Matthew versus equalizer effects at the micro (individual) level, we calculated the median score (in percentages) of the total sample's improvement scores, subtracting Time 1 from Time 2 scores and divided it by Time 1. This created a below-median subgroup and an above-median subgroup (n=6 for each group) in the total sample for each measure. Fisher exact tests examined whether significant differences would emerge between the two study groups' distribution of participants between below- and above-median subgroups. Namely, significantly more partial BA model students than enrichment students who scored above the sample's median of pre-post improvement would indicate a Matthew effect (Stanovich, 1986). Significantly more enrichment than partial BA model students scoring above the sample median for improvement in that measure would indicate equalizer effects (Downey et al., 2004).

Results

Macro-Level Analyses

Wilcoxon rank-sum analysis Z scores for students' pre-post improvement are presented in Table 3 for intelligence measures (WAIS-III^{HEB} scales/subtests) and in Table 4 for cognitive measures. Hypothesis 1, predicting students' pre-post improvement in both PSE programs on general and crystallized measures, was partially supported. Both groups significantly improved

their WAIS-III^{HEB} general and verbal IQ scale scores at Time 2. In fact, the partial BA model group's general and verbal IQ scores improved to such an extent that they no longer met the WAIS-III^{HEB} criterion for a diagnosis of intellectual disability (IQ<70-75) at posttest.

Also supporting Hypothesis 1, both PSE groups progressed significantly on their crystallized WAIS-III^{HEB} Vocabulary subtest (Table 3). The remaining crystallized areas of pre-post progress revealed different patterns for the two PSE models, mostly coinciding with our second hypothesis predicting an advantage for the more advanced degree. The enrichment group did not reveal significant pre-post changes in crystallized measures other than Vocabulary. Only the partial BA model group demonstrated significant improvement in three additional crystallized WAIS-III^{HEB} subtests (Similarities, Digit Span, Comprehension –Table 3) and in two crystallized cognitive tests (Synonyms, Contrasts –Table 4). Thus, supporting Hypothesis 2, the partial BA model group showed significant gains on a total of six crystallized WAIS-III^{HEB} and cognitive tests, whereas the enrichment group showed significant improvement on only one crystallized test. The partial BA model group's significantly higher verbal IQ scores at Time 1 (Z=2.89, p<. 004) were maintained at Time 2 (Z=2.73, p>. 06).

Regarding fluid measures, we did not formulate hypotheses for pre-post improvement or group differences due to the current empirical investigation's preliminary nature. Macro-level findings for the WAIS performance IQ scale demonstrated significant pre-post improvement for the enrichment group, but only near-significant improvement for the partial BA model group (p=.080). No significant group differences emerged on performance IQ scores, either at pretest (Z=1.53, p>. 05) or posttest (Z=1.13, p>. 05).

Both groups also showed significant pre-post improvement on two fluid measures – the WAIS Picture Completion and Analogies cognitive test. However, the remaining fluid domains revealed different patterns. The partial BA model group showed significant pre-post gains on two additional fluid cognitive tests (Phonemic-Fluency, Idioms) and a near-significant increase

(p<.057) on homophones. The enrichment group showed significant improvement for a single different fluid measure (WAIS-III^{HEB} Matrix-Reasoning). The partial BA model group's significant improvements totaled four to five fluid measures, whereas the enrichment group's totaled three. This pattern of favoring the partial BA model group on fluid measures contrasted with this group's non-significant progress on the performance IQ scale, suggesting that perhaps individual variability on that scale prevented statistical macro-level significance.

Participation in the partial BA model program showed positive significant Kendall τ coefficients (p<.01) with crystallized intelligence (verbal IQ) and WAIS-III^{HEB} general IQ, at both intervals. At baseline, students with higher crystallized intelligence were likely to be those admitted to the partial BA model (τ=.75 and .64 for general IQ and verbal IQ, respectively, p<.01). This association continued at follow-up (τ=.76 and .71, respectively, p<.01). The tau correlation between academic program and performance IQ (fluid intelligence) was non-significant.

Micro-Level Analyses

Fisher exact tests yielded four significant differences (two crystallized, two fluid) for the partial BA model versus enrichment groups' distribution of individual participants between below- and above-median subgroups. For crystallized measures, significant findings mostly supported Hypothesis 3 predicting a Matthew effect. For the WAIS-III^{HEB} verbal IQ scale and one crystallized cognitive test (semantic-fluency), five partial BA model students (83%), all except Student C, showed pre-post improvement scores above the sample median, compared to only one enrichment student (17%, Student J), Fisher's p<.04. The same pattern emerged regarding two fluid measures. For analogies and homophone cognitive tests, all except Student C in the partial BA model group compared to only Student J in the enrichment group showed above-median improvement scores, Fisher's p<.04. For these four measures, individuals' pre-post improvement supported a Matthew effect for most partial BA model students and equalizer

effects for only one enrichment student. The initially stronger partial BA model students gained more from their educational experiences than most of those in the enrichment program.

We further examined micro-level data for individual students in each group. For four partial BA model students (A, D, E, F), general IQ scores at Time 2 improved such that they exceeded the cutoff point for intellectual disability (Tables 2 and 3), and a fifth partial BA model student (B) reached IQ=75. Only partial BA model Student C, who developed emotional disorders close to testing time, exhibited decline.

Even more pronounced improvement emerged for partial BA model students' verbal (crystallized) IQ scores. All except Student C showed improvements, and four (A, D, E, F) even scored in the borderline and normal IQ range of 85+. For performance IQ (fluid intelligence), students E and F exceeded the intellectual disability diagnostic cutoff; students A, B, and D remained in the IQ range of 70-75; and student C deteriorated.

Individual enrichment students' data at Time 2 also revealed clear improvement patterns. However, as seen in Table 2, only student J's performance IQ score (77) exceeded the cutoff. Student I was the only enrichment student scoring within the 70-75 range.

Discussion

Importantly, this exploratory longitudinal study appeared to demonstrate the predicted positive impact of participation in both PSE programs on the intelligence and cognitive measures of adult students with intellectual disability, especially for crystallized domains. Overall, although both groups progressed, the partial BA model group progressed in more tested domains (10 tests, including 6 crystallized) than the enrichment group (4 tests, including 1 crystallized). Following 4.5 years of partial BA model into undergraduate courses, students' general and verbal (crystallized) IQ scores even increased beyond the IQ diagnostic cutoff of 75 (APA, 2013). Micro-level analyses yielded a Matthew effect for most partial BA model students and equalizer

effects for one enrichment student.

Education "Effects" – Pretest versus Posttest

The efficacy of long-term university-based systematic mediation of academic subjects for enhancing general and crystallized intelligence in students with mild intellectual disability during adulthood emerged not only for partial BA model students fulfilling standard undergraduate requirements, but even for those attending less academically demanding PSE enrichment courses. Hypothesis 1 was supported. Our findings support the hereditarian-environment (the new term for the nature-nurture) IQ debate. According to Nisbbet (2009), IQ is entirely, or almost entirely, heritable. However, nonhereditary factors such as environment play a more significant role than hereditarians assert. In line with the Environmental Enrichment Theory (Kentner et al., 2019), it seems that the holistic strategies mechanism in imparting academic knowledge strengthens brain plasticity of students with intellectual disability, as expressed in improvements in their *Gc* and *Gf* as well as in FSIQ after 4.5 years. Our findings also support the Compensation Age Theory (Lifshitz, 2020; Lifshitz-Vahav, 2014) according to which adults with intellectual disability can be modified even at an advanced age as they accumulate life experiences which compensate for earlier learning deficits (Lifshitz, 2020; Lifshitz-Vahav, 2014).

The gains in adults' intelligence following both PSE programs provide new support for Feuerstein's (2003) Structural Cognitive Modifiability and the Mediated Learning (SCM-MLE) theories according to which the human organism is a system open to its environment and accessible to change, even in the presence of three formidable obstacles usually believed to prevent change, to wit, age, etiology, and severity of limitation. Our findings suggest that students with mild intellectual disability can process basic academic material and actively promote their previously deficient skills for academic learning (APA, 2013) when receiving systematic mediation and learning strategies such as the Cognition-Affect-Behavior mediation model, Universal Design for Learning principles, and Bloom taxonomy (see Table 1). Such mediation

helped each group to complete 18 courses over the 4.5 years.

This study lent support to the previously found link between higher academic degrees, specifically in social sciences, and higher crystallized intelligence for adults with intellectual disability (Ackerman, 2000; Clouston et al., 2012; Moehring et al., 2018; Ritchie & Tucker-Drob, 2018). The effectiveness of the long-term inclusive educational experiences on the students was evident from the significant tau correlations and these students' meaningful shift in IQ-based disability status over time, mainly for crystallized but also for general intelligence. The partial BA model group's mean verbal IQ scores rose from ~75 to ~87, and their general IQ rose from ~69 to ~80, clearly exceeding the *DSM-5* upper threshold for intellectual disability (APA, 2013).

Academic Degree "Effects" – Enrichment Versus Partial BA model Models

General and Crystallized Measures: Partial BA model students' long-term academic activities promoted crystallized skills measured by WAIS-III Similarities, Digit Span, and Comprehension and by Synonyms and Contrast cognitive tests (Glanz, 1989), indicating PSE's impact on skills for finding common denominators and contrasts, performing auditory memory tasks, and understanding life rules. Challenging academic tasks helped partial BA model students consolidate acquired cultural and linguistic crystallized knowledge sufficiently to pass the threshold for IQ-based intellectual disability diagnosis. Thus, hypothesis 2 was supported.

The enrichment group's learning model (material selected for relevance to their world and adapted by academic facilitators with adapted requirements) may explain why this PSE model improved students' verbal IQ and several crystallized subtests, but not sufficiently to pass the diagnostic threshold. Although enrichment students also improved notably, they remained within the mild intellectual disability diagnostic range, showing increases from ~58 to ~65 in general IQ and from ~60 to ~66 in verbal IQ.

Fluid Intelligence Measures: The partial BA model group's lack of significant improvement in

fluid intelligence was surprising, considering previous research outcomes (Chen et al., 2017; Lifshitz et al., 2021). According to the Compensation Age Theory (Lifshitz, 2020; Lifshitz-Vahav, 2015), both PSE groups should have advanced in their previously absent fluid intelligence skills, as they matured and accumulated experiences over this 4.5-year period. Nonetheless, only the enrichment group did. Our micro-level analysis coincides with Haier's (2014) recommendations suggesting that high individual variability in the partial BA model group may have precluded macro-level significance for this small sample. Indeed, four partial BA model students increased their performance IQ by 12-15 points at follow-up. However, one student's score remained unchanged and another's (C) with non-specific intellectual disability, showed decline. It should be noted that this woman exhibited emotional problems that developed before entering the project. Nonetheless, she demonstrated improvement in crystallized intelligence (Vocabulary, Similarities, Information and Digit Span). Her 5-point decline in performance IQ suggests that perhaps fluid intelligence may be more vulnerable than crystallized intelligence to declines stemming from emotional problems. Although she was relatively young (age 37.5) at Time 2, her outcomes appeared to correspond with prior research indicating that adults with non-specific intellectual disability and mental health problems may show early signs of Alzheimer's disease (Lautarescu et al., 2017). This explanation is speculative. Reassessment of students C in the future is needed in order to confirm our claim.

In contradistinction, individual performance IQ scores for five enrichment students increased by 6-13 points (most prominently Matrix-Reasoning). Student J even reached a score of 77, which exceeded the intellectual disability diagnostic cutoff point. However, here other measures did not show such improvement. Only Student L in this group showed no pre-post change (IQ=69), and none showed decline. Thus, the mean group gain was significant (from ~61 to ~69).

The gains in performance fluid IQ of the enrichment group, especially in Matrix, could be attributed to the mediation they received from the academic facilitator. The WAIS-III^{HEB} Matrix subtest

(Wechsler, 2001) is comprised of visual analogical problems. The academic facilitator indicated that for the enrichment group, the new Bloom taxonomy (Forehead, 2010), including the Analysis stage, was at the core of the mediational strategies when teaching the academic material. Adaptation of this stage to a population with intellectual disability (Lifshitz et al., 2011) refers to similar stages of solving analogical reasoning (Sternberg, 1977): *Encoding* refers to identifying the relevant traits in components and their maintenance in the working memory; *Inference*/mapping refers to detecting the relation between components of the analogy; and *Application* refers to finding the correct component. These stages, which are used when solving the WAIS-III^{HEB} Matrix subtest (Wechsler, 2001) among a population with intellectual disability (Lifshitz et al., 2011; Vakil et al., 2011), might explain the higher gains of the enrichment group in fluid IQ, especially in Matrix which comprised of similar components that were mentioned above.

Matthew Versus Equalizer Effects

A Matthew effect (Duff et al., 2015), where individuals at greater initial cognitive advantage benefit more from additional education, emerged for all partial BA model students except student C. Equalizer effects (Stanovich, 1986), where individuals with initially lower intelligence benefit most from education, emerged for one enrichment student. These preliminary findings on populations with intellectual disability extend the prior literature that examined mostly typically developing populations. Enrichment student J's outcomes coincide with Tzuriel and Feuerstein's (1992) attribution of equalizing phenomena to traits such as individuals' higher motivation and tasks' greater complexity. Student J was very motivated, going beyond her PSE program's requirements, and taking academic material home to read in her free time. Her above-median scores were on verbal measures that were too complex for her enrichment group peers. They scored above the median on other measures like general IQ and performance IQ, but their distribution vis-à-vis the median did not differ significantly from the partial BA model group.

Limitations and Future Research Directions

This longitudinal study investigated a rare sample: 12 adults with mild intellectual disability who persevered in academically oriented PSE programs over a 4.5-year period. The scarcity of such long-term higher education students, especially fully integrated ones, precluded randomization or a control group. Comparison to other PSE programs focusing on social or adaptive behavior could yield a bias toward our cognitively oriented Empowerment programs. We therefore used non-parametric statistics designed for small samples with an abnormal distribution (Siegel & Castellan, 1988). We conducted complementary macro- and micro-level analyses to deepen understanding of the whole-group and single-subject findings (Gustafsson, 2017), which are increasingly utilized to assess intervention outcomes for persons with disabilities in educational, medical, and clinical settings (Ganz & Ayres, 2018).

Nonetheless, generalization from this small sample should be made with caution. Additional research should explore other PSE programs' impact on intelligence and cognitive skills for adults with intellectual disability, comparing diverse academic models in technical or liberal arts colleges or other PSE models (Fabian, 2021). Moreover, to determine whether intelligence will continue to increase in the current partial BA model and enrichment groups, follow-up testing should be administered in about three years. This will help uncover whether adult populations with intellectual disability exhibit an upper threshold for intelligence growth. Future research may also compare students who complete PSE programs with those who dropped out, to identify predictive variables.

The impact of PSE participation on students' psychological capital and other emotional resources should also be examined. Qualitative interviews could further investigate PSE programs' impact on students' motivation, curiosity, creativity, emotional intelligence, and life quality. Neuro-imaging studies could complement quantitative and qualitative instruments (Góngora et al., 2020). Regarding participants' heterogeneity, although some current micro-level

findings seemed to coincide with cognitive profiles characterizing specific intellectual disability etiologies, only further research with larger samples will permit conclusions about etiological trends as well as demographic or lifestyle factors.

Regarding educational implications for these PSE students' impressive preliminary outcomes, especially in central crystallized domains, we recommend inclusion of interested adults with intellectual disability in some form of long-term multi-year PSE academic program. Participation in cognitively stimulating activities may delay onset of Alzheimer's in adults with intellectual disability (Lifshitz et al., 2020). Other PSE models may include degree apprenticeships, which divide learners into traditional on-campus students and work-based apprentices (Fabian et al., 2021) for adults with intellectual and other disabilities.

If the current findings are validated by future research, key figures in the field of intellectual and other disabilities should be further exposed to notions of compensation and growth in adulthood and to PSE's potential for improving adults' disability status and cognitive functioning. The efficacy of PSE should be conveyed to policymakers in government ministries related to welfare and education as well as to rehabilitational and vocational administrators, families, and caregiving personnel. Policymakers should act to anchor PSE participation into legislation.

The PSE Empowerment Project is designed to accommodate diverse adults with mild and moderate intellectual disability in a variety of programs. Future efforts should empirically assess programs' efficacy, for example investigating potential equalizer effects, and should adapt programs to adults with severe/profound intellectual disability.

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Mediating to Parents of ASD Children

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Introduction

The past two decades have witnessed a significant increase in the occurrence of children on the autistic spectrum (Levy et al., 2007; Prizant, 2015). Recent studies report on new ways for detecting autism at a very young age (American Psychiatric Association, 2013, Klein et al., 2002; Greenspan & Wieder, 1988), suggesting evidence of successful treatments for children in the first years of their lives (Lovaas, 1987; Greenspan & Wieder, 2009; Bowker & D'Angelo, 2011; Feuerstein & Falik, 2005; Fred et al., 2004; Alonim, 2009; Sutera et al., 2007).

Despite conflicting theories about the causes of autism (e.g., Fischbach et al., 2015; Chaste & Leboyer, 2012; Ornoy et al., 2015; Rutter, 2005; Levy et al.,2007) and different treatments most specialists agree on the need for active intervention programs tailored to match the needs of ASD (Autistic Spectrum Disorder) children at early stages of development (Bowker et al., 2011). There is also a wide consensus that parents should play a central role in the designed program.

The issue of parental guidance raises many theoretical and practical questions. To mention just a few: How can we help parents to deal with their child's needs? What kind of advice can we give them in terms of the child's ability to be modified? What are the educational and developmental goals? What are the recommended strategies for dealing with daily life and practical matters? How can parents cope with their child's emotional difficulties, and those of the whole family?

Such questions become particularly complex in the context of the general confusion about parenting in the present generation. While in the past parenting was perceived as a natural process, based on traditional practices, modern parenting is understood as rather less so (Toffler, 1970; Bronfenbrenner, 1974; Elkind, 1981; Klein, 1992). Parents of normative children often seek advice from professionals, participate in parent groups and join online support groups, to discuss their children's learning, socialization, emotional problems, and so forth (Cohen, 2007, Forehand et al., 2011)

All of this becomes even more challenging when it comes to ASD children. Parents must manage with all the normal challenges of being "good enough parents": be sensitive to their child's needs, read his cues and respond properly, and treat him in ways that will support his cognitive, emotional, and social development (Winnicott, 1986). As is well known, coping with an autistic child is extremely stressful; the child's needs and desires are often unclear, his cues are hard to read, he lacks speech, he makes little eye contact, he is emotionally detached, and he often exhibits rigid, perseverant, and problematic behavior that is difficult to understand and to respond to (Klein et al., 2002).

No wonder, then, that studies examining parental coping with ASD children have reported high levels of stress among parents (Hayeas & Watson, 2013; Bonis, 2016; Hastings, 2003; Gray,

1994, 2003, 2006; Dykens et al., 2014; Zaidman-Zait et al., 2017). There is growing evidence that significantly higher levels of stress were found in families with ASD children than in families of children with other disabilities, such as Down syndrome, Fragile X Syndrome, and other developmental delays (e.g., Abbeduto et al., 2004; Dykens et al., 2014; Dabrowska & Pisuls, 2010, Hayeas & Watson, 2012).

Gray (1998, 2003, and 2006) conducted in-depth interviews with parents of autistic children, investigating their coping strategies with their child's condition. He explored three main areas: how parents cope with practical matters, how they manage on an emotional level, and what parents describe as the most important helpful general factor allowing them to deal with their children's condition.

On the practical level, parents mentioned a need to anticipate problems likely to arise in daily situations and plan their response accordingly (e.g., child's fear of crowded places or unfamiliar people, change of routine). This is not an easy task as one of the parents put it: "Most of our activities are non-interactive". Another stated: "I take one day at a time".

On the emotional level, parents reported two main coping strategies: either tightly controlling their emotions when dealing with their child, or strongly expressing such emotions. According to the parents, the main factor in their general coping with their child's condition was support from their spouse, other family members, friends, and their community. Aviad Friedman, author of *The Day You'll Call Me Dad* (Friedman, 2018), likewise cites support from family, friends, and community for coping with the hardships of raising their autistic child.

Several studies examined the role of parent-child interactions in language and communication development of young ASD children, focusing on joint attention as a means to facilitate children's learning through interactions with their caregivers (Adamson, et. al., 2009; Kasari, et. al., 2008 Schertz et. al., 2013; Paterson et al., 2014).

Shire, Gulsrudand & Kasari (2016) conducted an important study on 86 ASD toddlers and their parents. The study examined changes in parental responsiveness in two different intervention programs: In one group, the parents received a parent-mediated intervention, based on the JASPER approach (Joint Attention, Symbolic Play, Engagement and Regulation). They were taught to "read" the children's communication signals (e.g., gestures, language, and play acts), and the developmental sequence of children's play skills; then they were coached on strategies to promote the child's play skills with toys and people, focusing on topics such as structuring the environment, developing play routines, and expanding communication. In the second group, the parents received an educational, talk-based intervention (PEI); the parents spoke one-on-one with trained staff, who followed a scripted protocol, including information on ASD, child development, communication and social skills, behavioral principles, and teaching strategies.

Both programs were implemented for one hour per week, for a ten-week period. Evaluation was performed three times: when the program started, at the end of the program, and six months after it ended. There were no differences between the groups at the study start regarding parents' responsiveness and children's joint engagement. The change in time jointly engaged in child-initiated activities for the JASPER group from entry to follow up compared to the PEI group was statistically significant ($F(1,71) = 40.48$, $p < .01$).

Results at study exit showed a significant advantage for the JASPER group on joint engagement, as well as at the six-month follow-up. However, the findings of a secondary statistical analysis of a linear regression model indicated that responsive behavior alone may not be sufficient to ensure that support development continues over time for children with complex needs. In sum, the study findings demonstrated an association between parental responsiveness and children's joint attention across time. However, the direction of this association could be determined. Nevertheless, the researchers reported that the best results on joint engagement were found in the dyads where parents were responsive to the children's bids of communication and could also apply good strategies during the mutual activity.

The next section will describe the Feuerstein approach to parental guidance, which deals directly with these two aspects: a) Improving parent-child interaction based on parent's responsiveness and child's engagement, and b) helping parents to acquire more efficient strategies that promote the emergence of better cognitive emotional and social skills of their children through their mutual activity.

Parental Guidance with the Feuerstein Method

The Feuerstein Method (FM) is designed to help people reach beyond their manifest ability. As described in the Introduction to the Theory, the FM with ASD children is based on Prof. Reuven Feuerstein's theoretical framework (Theory of Structural Cognitive Modifiability (SCM), Theory of Mediated Learning Experience (MLE), and his three applied systems: the Learning Propensity Assessment Device; the Instrumental Enrichment; and the Shaping and Modifying Environments. Although these tools were created for students and adults, when the numbers of parents who sought guidance on supporting their young special child's specific needs (Mintzker, 1991, 1997) increased exponentially, the FM was applied to meet the needs of younger children. An important aspect of the clinical work with young and/or special need children at the FI is focused on helping parents become active mediators who understand the theoretical and practical aspects of their children's learning and developmental processes.

A rough, global description of the FM approach to parental guidance may thus be shown as building blocks, which form its basic structure. However, when facing real life cases, these building blocks have to be tailored and mixed with finesse according to the specific case being treated.

Building Block #1: Observing the Child's Dynamic Assessment

Parental guidance begins the moment parents arrive with their child for the dynamic assessment and this can also be described as the first building block. Notably, in the FM, the presence of parents, caregivers and teachers during the assessment is an integral part of the young child's dynamic assessment. The parents, who participate throughout the dynamic process, thus witness how their child’s learning process and behavior can be modified through mediation. They learn about their child’s strengths and weaknesses, and models of mediation and types of activities that can promote their child’s deficient and proper cognitive functions (Mintzker, 1997; Levine, 1997) are recommended. For example, the examiner might tell a child

who makes no eye contact: "David, when I talk to you, please look at me, so I can see that you understand"(*Mediation for Control of Behavior; Mediation for Transcendence*). When the child glances at the mediator after much looking around, the mediator says: "I see you remembered to look at me now…It feels good, because I can see that you are listening, and you can also understand better"(*Mediation for a Feeling of Competence; Meaning and Transcendence*).

If the child seems intimidated by a task, the examiner might say, "This is really difficult, but you can do it and I will show you how." Thus, we mediate according to the child's ability: we offer physical support to a child who still needs "hand in hand" support, ensuring that our intention is clear to him and he is reciprocal towards us and the activity, and that he gets a sense of the meaning of the task combined with some emotional aspects, such as: "look at this beautiful picture in the puzzle" or, "here we can see the nice dog, just like your dog." This also mediates for *transcendence* by making a comparison and directing the child's attention to a broader, more symbolic aspect of the situation. We might introduce control of behavior by saying "look, if you turn this part, it might fit in here" and *mediate for a feeling of competence* by saying not only "good job" (a positive reinforcement which makes the child feel good but may not leave him with a strategy for completing a different puzzle), but rather saying: "you did a good job because you put the part exactly in the right place and it fits by color and by shape…."

As mentioned earlier, during the assessment, we refer to *emerging* cognitive functions rather than to *deficient* functions, and the parents receive explanations about tools that match the young child's interests. Furthermore, when in the course of the assessment we evaluate the child's general knowledge, understanding of concepts and super-ordinate concepts, ability to associate and draw conclusions, and to apply his learning to new situations, the parents receive clarifications about the process and the cognitive functions as the building blocks of thinking. For example, we might inform the parents that their child tends to avoid tasks that seem difficult, but when we tell him "this is really hard, but I will help you"; or, "I will show you an easy way to do it," he will continue to perform the task.

An important part of the dynamic assessment of young children is that the parents receive information that will help them think of their child not simply as an autistic child, with all the negative connotations that follow this definition, but rather as a young person who can be modified (Feuerstein et al., 2006). It is our role as professionals and their role as parents to give the child the necessary mediation to support the emergence of cognitive, emotional, and social abilities that have thus far remained hidden. In this way, the child will be able to grow into a productive member of society and be integrated, to the greatest extent possible, within his community.

In the FM, parents are encouraged to adopt an optimistic approach to their child's condition. They should be helped to understand that whatever the reason for the condition, studies on neuro-plasticity confirm that the brain is indeed flexible (Doidge, 2007; Malabou, 2008; Feuerstein et al., 2015), and that by applying mediation appropriate for the child's needs, he has the option of being modified. Indeed, he can even learn to modify himself through self-awareness and self-consciousness.

The FM view is that intelligence, including emotional intelligence, is a flexible state rather than a fixed trait, and that performance often depends on the conditions of the situation. Parents are

urged to adopt this belief, which can mean all the difference in how they deal with their child's mood swings or rigid responses.

At the diagnostic wrap-up meeting, parents are provided with information about the process they have witnessed and are presented with recommendations. These include information on the child's learning profile, implications of the profile, suggestions for an appropriate educational setting, and ideas about the involvement of various professionals. Discussing future goals for the child is part of the theoretical facet of the parental guidance. It should be noted that Prof. Feuerstein advocated, to the greatest degree possible, the integration of children with special needs into normative educational settings. Importantly, such children must be prepared in advance, so that they can master the basic learning skills before beginning the inclusion process. The FM designed and implemented a special program, described in this book, for preparing children for integration.

Building Block #2: Parent Education on the Feuerstein Method

In Building Block #2, we provide updated information on autism and mediation, aiming to influence both the parents' understanding of their child's condition and the application of the theories of Structural Modifiability and Mediated Learning Experience. Parents are also presented with the distal and proximal determinants of differential cognitive development. This parental guidance is rooted in the principle of prompting the parent's belief system to move from a passive acceptance of the child as he is towards an active, modifying approach.

As mentioned above, parents are introduced to the theory of Cognitive Modifiability and are encouraged to move from a passive-accepting to an active-modifying approach towards their child. Parental guidance focuses on influencing the parents' belief system, convincing them that regardless of one's starting point in life, we all have the capacity to modify ourselves through experience and encounters with new realities.

Later in the treatment program, parents are introduced to the theory of Mediated Learning Experience. With young children, we focus mainly on the six basic ones: *Mediation of Intentionality and Reciprocity, Mediation of Transcendence, Mediation of Meaning, Mediation of Feelings of Competence, Mediation of the Regulation of Behavior, and Mediation of Sharing Behavior* (see Feuerstein, Mintzker et al., 2006). In addition to developing a general understanding about these criteria, parents are encouraged to discuss their child's specific problems, typical areas of conflict in daily life, and so forth. We offer suggestions regarding remedial mediation and how various problems can be solved when certain changes are made in the course of their habitual approach towards the child. (Examples that are more specific will be discussed further on).

Following the child's LPAD sessions, the diagnostic wrap-up meeting, and explanations of the Feuerstein approach, parents receive individual parental guidance. The content and examples given during the instruction vary and are chosen by the mediators to suit the specific needs of the child and his family. The format for the parent's instruction is also diversified. Nevertheless,

the main goal is to help the parents become mindful mediators to their child, so that he will live in the best conditions in which to materialize his potential.

As aforesaid, all parents receive individual training, and we also suggest training in small groups. In these formats, parents are encouraged to discuss matters that come up at school or home and receive advice about dealing with their child's needs.

Building Block #3: Interdisciplinary Training and Buy-In with the Feuerstein Method

Moving now to Building Block #3, staff meetings with teachers and therapists in the child's educational setting are also held with the aim of formulating the child's personal study program, including, when appropriate, school visits. The channels of communication are kept wide open, and parents are informed of the child's personal program so that they can nurture his learning.

> Importantly, parents' participation during therapy sessions is an integral part of parental guidance. They can observe their child during Speech Therapy, Occupational Therapy, and so on, and can learn how to mediate in these specific domains. As they become familiar with the criteria of mediation, parents can apply *intentionality* to reinforce what they observed during the therapies. For example, they might repeat at home a word the child recently acquired, work with him on how to ask a question, and provide *Mediation of Meaning* and *Mediation for a Feeling of Competence* when he remembers to look at his parent's face when she/he speaks with him.

Professor Feuerstein believed that the brain is characterized by both top-down and bottom-up processes, and that intelligence is not as a fixed trait, but rather a state, affected by stimuli coming both from the outside world and from one's inner world (thoughts, emotions, attitudes, etc.). He stressed that we are all shaped simultaneously through both biological and social channels.

The FM theoretical framework contains two main types of learning: a) learning through direct exposure to stimuli, and b) learning through a mediated learning experience (MLE). In fact, the goal of MLE is to prepare the individual to acquire the tools that will allow him to become an efficient learner through direct encounters with the world of stimuli, situations, and relationships—to be able to draw on existing knowledge and prior experiences to solve new problems. Learning by direct exposure is in line with the natural biological learning mechanisms (as discussed by Piaget, for example), while the Feuerstein Mediated Learning approach relies more on social learning (see also Vygotsky, 2012; Feuerstein, 1998; Kozulin & Lurie, 1994).

Feuerstein argued that MLE might fail to occur in a child's development because of mediator-related reasons; for example, he or she might not mediate to the child due to some particular, personal issue. However, the mediated learning experience might also fail to occur because the child, for some internal reason, is not open to accept the mediation offered to him.

When an individual is not inclined to accept the mediation provided to him, he cannot benefit from the social aspects of learning and will rely mostly on inputs he receives through his senses.

Consequently, his learning will occur mainly through direct exposure to stimuli. Mediation that occurs through the social channels will hardly be available to such an individual.

The autistic child fits the second category. Because autistic children are not open to those around them, they are not inclined to gain from the mediation offered to them. This becomes a severe barrier in their ability to notice others, learn from and with them, and enjoy their company. Because they do not pay attention to others, they do not notice … they do not focus on … they do not imitate – and therefore learn little through modeling. In this way, such children tend to stay shut in their own inner world.

When the parent of an autistic baby smiles at him and tries to capture his attention and communicate with him in the natural way most parents do, the child remains blank and unresponsive. Why this happens is still unclear. The literature is loaded with theories, ranging from genetic, to neurological and beyond. Considering here the dynamics of the parent-child interaction, we might liken the situation to trying to send a message when the amplifier is shut down and the message, though sent out, cannot get through. This message was transmitted but not received.

Additionally, the parent-child interaction is a delicately balanced dyadic relationship in which each side influences the other. So, when time and again the child does not “smile back" at the parents, the behavior contributes negatively to the parent's perseverance in approaching the child. How often can a parent be disappointed and still try to engage in meaningful communication?

At this point, I would like to share a personal memory from a study I conducted with Pnina Klein. Note that although this study did not deal specifically with ASD children, it sheds light on an important aspect of the dynamics of parent-child interaction. In the study, parents were guided to apply the five basic criteria of MLE in their interaction with their children (Alony, 1990; Klein and Alony, 1993). A mother of a normative child, 9 months old, told me after she offered her baby three different toys (recorded on a structured videotaped observation studying joint play) and he sat and watched her, "See, nothing interests my child!" I must admit that, standing beside them while we took the video clip, I noticed no reciprocity in the child to his mother's attempts. Interestingly, when we analyzed the video, it became obvious that each time the mother showed a toy to her baby, the child's tiny hand began reaching out towards the toy … at which point the mother took it away and brought in another one. The child's reaction was delayed, and the hand movement so minimal that, even standing there, close to them, I did not notice it. In fact, then, there was a mother eager to mediate and play with her baby, and a child that was curious to touch, manipulate, and experience the toys—but due to a mismatch in their natural tempo (based on their different temperaments: a slow child and a temperamental mother), their chance for joint activity was diminished. The mother was convinced that nothing interested her child. Thus, the question was: how many times would she continue to try before giving up? Even more interesting was the question: how did his affect the child? How many times would he try to reach out and be left empty-handed?

As a therapist, I experienced this as an “aha” moment: suddenly, the crucial importance of synchronizing joint activity on a subtle scale became crystal clear. This real-life example dramatically demonstrated that when a parent-child relationship does not flow smoothly, the

blockage might be misunderstood and misleading. More positively, it points us to helping parents understand their child's behavior and make the proper adjustments in the way they mediate to their child.

It should be stressed that the child in the above example was a normal child who was developing according to his age. When the mother received an explanation and began to grasp the dynamics of their interaction, she adjusted her mediation to the baby's pace –she slowed down and let the child take his time to respond. The mother-child interaction thereby improved significantly, becoming more enjoyable and beneficial in every sense.

Parents who must learn to mediate to their ASD children are faced with the same challenges—and many more besides.

Feuerstein described twelve criteria of mediation; the three first are considered crucial for every mediated interaction, and the others should be presented variably, in accordance with the situation. However, in our clinical work with young and very delayed children, we found the following six criteria particularly important.

In studies that applied the criteria, the five first were implemented. However, in our work with ASD children, we found *Mediation of Sharing Behavior* of critical importance in encouraging the emergence of the emotional aspects of the relationship.

1. *Intentionality and reciprocity* are the first and main conditions of an MLE interaction: an effort to create a relationship of reciprocity, rich in behavioral, mental, and emotional components. The content, which varies from the most basic to complex and abstract, bears a special quality when shaped by intention.

2. *Mediation of Transcendence* goes beyond the basic needs of the interaction; beyond the immediate, concrete experience. It answers the questions of “When, where, how, how much, and by whom?” It is meant to facilitate the development of skills and a broader understanding that will be useful and applicable in new situations. Transcendence deals with generalized, more abstract components such as color, shape, size, numbers, cause and effect, comparisons, orientation in space, orientation in time, and opposites.

3. *Mediation of Meaning* deals with the emotional, energetic dimensions of the interaction. It answers the questions: “Why?” and “What for?” This mediation engages with the values and beliefs in the child’s family and cultural environment.

The mediator imparts special meaning to a certain stimulus, thereby emphasizing its significance beyond the ordinary. Another important aspect of this mediation criterion is that it promotes the need to seek for meaning (in a broader sense —in the future).

4. *Mediation of the Feeling of Competence*

A true feeling of competence develops based on positive achievements in real life. Nonetheless, this feeling must be reflected in the view of others.

The mediator interprets the child’s behavior, pointing out the positive elements of his performance and making him aware that he succeeded.

5. *Mediation of the Regulation of Behavior* consists of opposite activities: both the inhibition and initiation of behavior. It requires a) restraint of impulsivity; b) thinking and planning ahead; and c) answers the questions: “how", "in what way”, “in what order,” etcetera.

6. *Mediation of Sharing Behavior* reflects the need to go beyond oneself and participate with others in mutual, joint experiences. Different families and cultural groups have different styles for this criterion.

Building Block #4: Guiding Parents on Mediation

While mediation should be tailored to the specific abilities and needs of the child, our observations at the Feuerstein Institute indicate certain problems that are specific to autistic children:

a) Autistic children tend to have limited receptive and expressive language. In terms of language development, they are still at the pre-communication phase (see chapter 8) and lack the prerequisites for speech and communication, such as eye contact, focusing, imitation, turn-taking, and so on.

In terms of psychological development, these children are still unable to understand their immediate environment, including those within it. Their activities remain centered around sensory-motor experiences, and they prefer dealing with concrete objects, movement, and spatial aspects.

b) Because ASD children have limited speech, their parents often assume that they have limited understanding. Accordingly, they do not offer broader explanations and tend to refer to the immediate need at a given moment – not expanding on its implications. Such parents often use short sentences and provide directions in the form of orders to the child, because they do not expect him to understand beyond that level.

c) Many children who are treated with the FM were previously exposed to behavioral education methods that focus on the stimulus-response approach. In this method, the child has to form the proper connection between the two, but understanding is not necessarily required. We have found that many parents adopted this approach, expecting the child to behave according to rules that he does not understand.

d) Oftentimes, ASD children who seek FM treatment lack general knowledge about the world. Since they cannot ask questions, they deal mainly with the things that they manage to figure out on their own, based on information they have gathered through their senses. Moreover, because they lack the expressive language that might allow them to relate to some more advanced ideas and because they do not perceive people as a source of useful information, they stay within their own limited world. This mode of functioning leaves them to what they can figure out on their own. As such, they remain deprived of the vast cultural experience that humans have transmitted to each other over the course of millennia.

Applying the basic criteria of mediation, especially *Mediation of Transcendence* or *Mediation of Meaning* in the parents’ regular, daily interaction with their child will expand the child's

understanding about the world around him. This includes general rules as well as useful behavior that can help him to solve problems on every level. As is true for any child, the *Mediation of Meaning* is especially important when it comes to dealing with emotion. It is particularly true for autistic children, however, who are less sensitive to affective cues, and are less tuned in to the emotional aspects of their communication. It is, therefore, even more important that their parents expand by sharing and mediating to the child the meaning of things or events that excite or even upset the parents. This may contribute to the child's awareness of emotions, to the fact that the world is not flat, and that people are not indifferent. Studies have shown that children who receive *mediation of meaning* develop a need to seek meaning (Alony, 1990, Klein & Alony, 1993). Mediating to the child that he is loved and important, and that what he does is meaningful to others, contributes to the build-up of a child's self-image and adds to his emotional nature.

Yet we are left with a critical question: How can a parent mediate to a child who does not pay attention to him, and shows no reciprocity?

Building Block #5: Remedial Mediation to ASD Children

At the beginning of treatment, we mediate to parents that their most crucial task is to help their child understand that doing something with another person can be enjoyable, and that they can benefit from mutual activity. Our observation using the FM, as well as in the MISC (More Intelligent Sensitive Child) program (Alony, 1990; Klein & Alony, 1993), is that *Mediation of Intentionality and Reciprocity* is the master key that "opens the gate" and permits mediated learning experiences to take place. We have also seen that with young or very delayed children, these are two links of a chain that need to be coupled together, and the mediator is responsible for maintaining the link between them. To facilitate the interaction, the parent must sometimes produce a change in himself or in the environment (Schertz et al., 2013).

Thus, rather than approaching the ASD child with the idea of engaging him in a specific activity, we observe his play and join him in *his* activity. In that way, we establish a "reciprocal" reaction to the child's intention: now he is leading the game, and we join him in what he chooses to do. We explain to the parents that our main goal at this point is to have a joint activity with the child—of whatever type. Thus, if the child is knocking on a wooden block, we join in and imitate him. Next, we might decide to turn it into a knocking game: count the knocks, change the pattern and laugh, sing along and surprise the child in a funny way. If the child builds a tower with the blocks, we can build beside him and then form a long train of blocks—showing him that there are many ways to build with the same blocks.

We further turn to apply *Mediation for a Feeling of Competence* with specific explanations about what was good about what the child did. In this way, he can experience that his actions are successful and enjoy being appreciated by us. This also leaves the child with the feeling that participation with another is satisfying. Note that Greenspan and Weider's (1988, 2009) Floor Time approach deals with the similar aspects of the ASD child

It is crucial that parents and therapists be reciprocal to the child's lead, joining him in something that he himself initiated; this will provide a trigger for improving communication and fostering the emergence of basic skills.

Mediation of Communication - Special attention should be given to mediating to the child the importance of mutual eye-gaze and reinforcing this gaze when it appears. Consider for a moment Dina, a five-year-old autistic girl, who arrived for assessment with no eye-gaze. Feuerstein said to her: "look at me, see what I have here?" and he offered her a piece of candy; Dina watched him and tried to get at the candy in his hand. He then hid the candy in his palm, just in front of her eyes, and she persisted in trying to get it. This scene was repeated several times, until the Professor started laughing—and so did Dina. A positive rapport was sparked. When he later suggested something else to Dina, he added the statement: "Look at me"—and so she did. He responded, "It is very good that you looked at me, because now you can follow what we are going to do".

In this way, we make the child aware of the need to look at the other, to follow, and we encourage even the smallest change in this direction. This is providing *Mediation for a Feeling of Competence* and training the child to focus in the direction of our intention.

Building Block #6: Repetition of Mediation

In Building Block #6, parents are encouraged to apply the criteria of mediation in their daily activities with their child, including during eating, cooking, playing, taking a walk, and shopping. Meditational activities should be repeated again and again, thus enabling the child to perceive and absorb the stimulus. Studies have demonstrated that using the criteria of mediation with normative children positively affects children's cognitive and emotional development (Alony, 1990; Klein & Alony, 1993; Klein, 1996; Tzuriel, 1999; Isman & Tzuriel, 2008; Tzuriel, & Shomron, 2018). Our clinical observations using the FM reveal that active mediation is a powerful tool that can have a strong impact on special needs children.

The next section introduces us to Ron, an autistic young man who was treated at the Feuerstein Institute. We will follow Ron's development from birth until the present, as well as read about the application of the FM to his treatment.

Ron is now a married 28-year-old who is employed by important and big company. He and his wife live independently, in their own apartment. Ron is currently taking a course on maintaining home electric appliances, and volunteers as a DJ for celebrations and social gatherings.

Ron's journey is a story of courage and commitment. Prepare to be inspired.

Case Study: Ron

Ron's parents applied to the Feuerstein Institute for assessment and parental guidance when he was three and a half years old. In their letter, they wrote: "*Ron does not cooperate with professionals during the assessments. …Psychological assessments of Ron were based on scoring his correct answers during tests and were focused mainly on the things he could not do*." They, however, described all the things their child *could* do (e.g., request assistance, select his own clothing, feed himself with a spoon, select his own toys). They continued, *"We believe that the child has higher abilities and we want guidance on how to encourage his development."*

As we read, Ron's parents thought that there was more to their son than what could be detected through static, quantitative testing.

Many parents come to the Feuerstein Institute with similar hopes, discouraged by the label "autism" and downcast by the gloomy prognoses they receive from professionals. Note that the prognosis concerning ASD children are often quite depressing. A mother of an autistic child told to us that their pediatrician had said to her, in a sympathetic tone of voice: *"There is no point in talking to this child, because he is autistic and does not notice you, in fact, you are just like this chair to him.*" While this example is extreme, it reflects a common notion that autistic children are unable to form human relationships, and that they treat others as objects.

Ron arrived at the FI with assessments that described him as having limited speech, severe communication disorder and behavioral problems, and motor development delays with rigid, repetitive movements. He was assessed as moderately retarded, with communication problems that limited additional areas of development. It should be noted that Ron was diagnosed as autistic when he was five years old.

A. The pre-communication phase.

In her interview, Ron's mother described Ron's early childhood as a demanding time:

> *I knew from the start that something is wrong…. Ron was a difficult child, crying all the time. Ron did not respond to us when we came close to him, made no eye contact. When he was three, he smiled once…but did no more. This was an unusual event, because he was detached all the time, staring around with a dreamy, glazed look in his eyes.*
>
> *He was different from the beginning. At four months he did not reach out to grab an object, although he was able to do so…. He used to hold a picture of Mickey Mouse and smiled at it. However, he did not smile at us. The first year was especially hard. The doctors kept saying, "He is a doll of a baby, what do you want?" But I kept feeling that something was wrong. He did not reach out for things or put them in his mouth. It felt as if there were a stuck key….*

Many parents of autistic children give similar accounts of their child's first year. They say that they felt all along that something was "off," although they may not be able to define it precisely. The child does not smile back at them (Mintzker, 1997) and does not follow them with his eyes.

The Israeli author Aviad Friedman (2018), for example, depicted the first twelve months of his son Avrumi's life as a year of horrors:

> *Avrumi did not stop crying for one minute. Not by day and not by night…We became unpleasant to be with. Who wants to be around a couple that goes everywhere with a child who screams all the time…?*

For his part, Ron showed a slow developmental trajectory, and his early predispositions for communication feeble.

> *Ron started regular nursery school when he was a year old, but he was delayed. He still could not walk at one and a half, drooled a lot, kept throwing things all the time, and I demanded an evaluation. He was diagnosed as moderately retarded and at two years old started attending a special nursery program.*

Ron's mother stated that she had read about his diagnosed condition and set a goal for her son to be able to travel independently by bus as an adult.

With her healthy instincts, Ron's mother demonstrates an impressive example of positive psychology that is consistent with the Feuerstein Method of setting concrete goals for the future, which require practical preparation. For a delayed child to travel independently by public transportation, he will need training in orientation in space, planning ahead, independence, and communication skills.

When Ron was three years old, he switched to another special nursery school. His teacher reported his behavioral problems: flipping, spinning, making loud voices and even shouting, especially when he experienced an activity as difficult for him. *"He makes eye contact with other children, plays beside them sensory-motor games, mainly with cars.…He makes good eye contact when it involves fulfilling his personal needs—but by his own choice only…. He understands basic instructions and can follow them, but he is able to deal only with one thing at a time."* The teacher noted that Ron loved music. Below, we will learn how he harnessed this love for the good of many people.

B. Ron's First LPAD Assessment

Ron's parents came with him to the Feuerstein Institute for assessment and parental guidance when he was four years old. He was a beautiful boy with big blue eyes. He presented as an active, lively child, with limited speech. Ron made sporadic eye contact and was ready to communicate on his own terms only. Following mediation, he had participated willingly with Prof. Feuerstein and was referred to me for further evaluation.

Ron was assessed through the LPAD dynamic approach, which evaluates an individual's functioning as well as his modifiability, thinking, and learning patterns by means of a structured learning process; that is, measuring his baseline performance, observing his reaction to structured learning, and measuring performance after mediation. Feuerstein suggested seeking "islets of normalcy" in an individual's functioning, setting the peaks of ability as a marker for his capacity - rather than focusing on the quantity of incorrect answers on the given tasks.

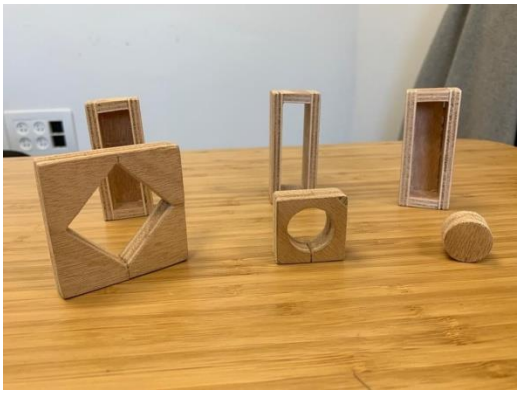
My first impression was that Ron was a sensitive child who responded positively when he felt warmly accepted. He attempted to repeat my name and was ready to play and cooperate, albeit

only with toys of his own choosing. He did quite well with geometrical shapes, completing basic puzzles, pointing at pictures (identified by name) and matching them correctly. His speech was below his age level, but he learned quickly to imitate, and to name objects. Overall, he behaved like an active child younger than his age.

Ron was fascinated by a set of three-dimensional blocks designed by Prof. Feuerstein. These blocks are designed to be taken apart and reconstructed into a complete three-dimensional cube. This is quite a complex task, since the child has to consider the size and shape of the parts and then reassemble them in the correct sequence.

An example of the three-dimensional blocks

One of the constructed blocks



Steps in the reconstruction process

Ron constructed several cubes, one after the other, skipping the demonstration phase. He was highly motivated, showing good attention span and focused organization. From time to time, he would glance at me, happy to be complimented. In terms of Feuerstein's term "islets of normalcy," Ron's competence was above his age level, and exceeded his performance on other, simpler tasks. He exhibited good intuitive perception, spatial organization, part-whole relationships, analysis and synthesis, and sequencing. This performance was remarkable for a child who could not rely on the use of concepts as linguistic tools to support his thinking.

Despite these advanced qualities, however, Ron's general behavior was rather rigid. When he was asked to switch from a task of his choice to another suggested activity, he became quite stiff, and, when he agreed to cooperate, he seemed unhappy.

Ron started "acting out" when I sat with his parents to sum up the meeting, and it was suggested that he play in the room. We then witnessed a frenzy of activity: the soap from the sink flew in the air, he insisted on disconnecting the electric wires, repeating: "light," light," "light" …and "broken… broken…"In this way, Ron provided a full display of his behavior during his free time at home. It was also clear, though, that beside the intensive spinning and his repetitive movements, Ron was actually practicing his power to control and manipulate the objects (by switching the lights on and off), and in exercising reversibility (up and down with the soap, on and off with electricity). Importantly, Ron noticed my attention and then glanced in my direction, indicating that he was aware of my reactions to him.

Ron's Feuerstein assessment indicated a strong potential for learning and modifiability. He benefited from the mediation he had received, understood explanations, improved his performance, and applied his learning to solving new problems. We found his receptive language better than his expressive abilities. The recommendations were to focus on speech and occupational therapy; to encourage the prerequisites for communication, such as eye-gaze, verbal and motor imitation, focusing, and turn-taking, with special attention paid to both receptive and expressive language, following parental guidelines based on the Feuerstein Method. We recommended educational integration with normative children one or two years younger than Ron - to close the gap between him and his peers, and to encourage his imitation of speech, play, communication, and social activities.

It is noteworthy that Feuerstein believed strongly in the importance of inclusion – and particularly so for ASD children. In his view, placing an autistic child with communication problems with other children who have difficulty communicating prevents the autistic child from acquiring social skills, whereas being in the company of sociable children has the potential to contribute to this child's socialization. We also recommended that Ron join our program of preparing for integration at our Institute in Jerusalem.

C. Learning to understand the environment and the people within

Ron continued in his special nursery school until the end of the year and traveled with his parents on a weekly basis, attending our program of preparation for integration. As part of his

individual curriculum, Ron received an intensive speech therapy program, and his mother participated in a group program for parents on the theory and practice of MLE.

Parental guidance at this stage centered on developing reciprocity with others, encouraging joint activity, promoting the emergence of communication skills (see chapter 8) and expanding general knowledge about the world. Emphasis was placed on naming objects and basic concepts as part of the child's everyday life experiences, modeling self-talk: "I am very hungry now, so I will eat this salad," or "I am very tired now, so I will go and take a nap." It was mediated to his parents. so that Ron could internalize this modeling activity and imitate in the future when he was ready to do so. In fact, this was a *sharing behavior* with others around daily life situations. Several years later, Feuerstein referred to this language modeling as “soliloquy” (see chapter 4) and “self-talk”/”mediated self-talk” (Feuerstein et al., 2008).

Ron made significant progress quickly: his parents reported positive change in his conduct, and his teacher wrote that: “He is improving, understands the rules of the place, is beginning to generalize regarding pictures and toys, and is more verbal -although his speech is still not directed to another specific recipient. He is also beginning to imitate his peers."

When Ron came for an LPAD follow-up, important developments were reported particularly with respect to language comprehension. He was more communicative, using gestures to convey his intention when he lacked the right words. He also started to use four-word sentences: "Look, here is a flag"; "This is the flag of Israel." Verbal sharing was noted, indicating that he had become aware of those around him. He was emerging from the egocentricity that characterizes younger children, trying to relate to others with his still-limited linguistic tools. Thus, Ron was signifying a new need to share his observations with others and convey his views through cooperation.

D. Paying attention to person and task

Ron continued to make steady progress, developing new skills and becoming more communicative. During the LPAD sessions we used the Peabody Picture Vocabulary Test (PPVT, Dunn & Dunn, 1959), which assesses children's receptive vocabulary ability. The PPVT is considered a verbal IQ test, and we apply it in a dynamic technique (Alony & Kozulin, 2007, 2015). When we first met Ron, taking a formal test was beyond his ability; only when he was 4. 7 years old were we able to use the PPVT with him. At that time, his raw score was 13, equivalent to age 2.5 years. He scored 61—equivalent to age 5.3—when he was 5 years and 7 months old. Notably, this impressive change occurred over fewer than two years.

One morning, I received a call from Ron's mother. It seems that the family had gone on vacation, during which time Ron had acted out to the point at which his parents felt unable to enter the hotel dining room. When I suggested that she explain to Ron how he was supposed to behave in such circumstances, she exclaimed: "Explain to him? But can he understand?" I responded with a recommendation for a multi-level mediation: a) first, to speak with her son about how people are expected to sit in a restaurant; b) next, show him cafes in their city, pointing out how parents and children behave (including all the details);c) then, inform him that you are planning to take him to a cafe and remind him how he is supposed to behave; d) take him to a cafe and

let him choose his food, and e) crucially, mediate to him the feeling of competence when he behaves nicely, listing all the things that he did correctly. This was the work of several days, I explained, and every single aspect would need to be clarified and practiced multiple times. Ron's mother walked out of our session with a dubious expression on her face. In the next call I received from her, though, she was clearly all smiles: "I explained to him and he understood!" On their next vacation, Ron's behavior was indeed exemplary—demonstrating that the child had learned from the mediation he received about appropriate conduct in a restaurant. Since many ASD children find public spaces difficult, mediation about the place, the reason for going there, what and whom they will meet there, and the rules of the place can help children overcome their anxiety. Critically, this mediation of control should be offered in advance, so that the children are aware of the situation beforehand. *Mediation for a Feeling of Competence* should also be given, with specific explanations about the elements that lead to successful performance.

No wonder that when I interviewed Ron's mother a quarter-century after this event, she herself brought up this moment. This was a major turning point in the way she mediated to Ron. It had helped her realize that when things were explained to him on both a concrete and conceptual level, including modeling, he could adjust to new real-life situations.

In terms of the criteria of MLE, this was an experience that left Ron's mother with a new awareness that she could apply to other and different situations during future interactions with Ron (*Mediation for Transcendence*). Hence, while parents acquire tools to mediate to their children, they learn through the mediation given to them to look for goals that go beyond solving here-and-now problems and seek ways to help their children move toward a higher cognitive and emotional level.

E. Starting inclusion—and using language to communicate

When Ron was six and a half years old, I accompanied his parents to the Placement Committee to recommend his inclusion in a normative kindergarten for the next school year. This was towards the end of the school year, and, much to our surprise, the committee decided that Ron should begin his integration process immediately. Ron's parents were quite anxious about this decision: they wondered how he would cope with the new environment as well as a classroom full of students who already knew the rules of the game. My advice was: "Let's rely on Ron's islets of normalcy and give it a chance."

Ron exceeded all our expectations: he worked, played, and danced with the other children, and took part in the final show. All the while, the teacher complimented him on his conduct. She reported that although he was somewhat anxious, the children welcomed him– and she promised to help him integrate.

Ron had a successful final month of the school year and continued in the same kindergarten the following year. At the start of year, his teacher told us: *"it just could not be better! The boy changed completely. He sits during the group meetings without moving around, shares ideas with the other children, uses complete sentences, and is reading words with no mistakes. The children just love him, and he behaves very nicely. It is just a dream come true."*

Ron continued to progress in every way, responding to the influence of his classmates, and the mediation of his parents and close family that expanded his understanding and knowledge.

At this point, an important aspect of inclusion must be noted: the teacher's positive attitude can be a decisive factor in a child's success. This is particularly true in Ron's case because he came to the kindergarten with no support teacher; it was the teacher's task to respond supportively to his special needs.

Ron had another LPAD evaluation when he was 7.5 years old, and the report revealed significant and promising change:

> *We were very impressed by the progress in his social relations, the level of concentration and perseverance, his learning skills and his ability to control his behavior and successfully perform the tasks given to him. The flipping and rigid motor behavior, which used to appear at stressful situations, has stopped completely, and he responded matter-of-factly and verbally to situations that came up. On tasks that seemed to him difficult or when he needed to invest extensive effort, he told the examiner: "I have no more patience". At certain parts he even laughed at himself; when he failed to cope, he laughed aloud and without self-consciousness.*
>
> *… The most impressive change can be seen in Ron's verbal and communication abilities. He speaks freely, building complex sentences that include verbs, adjectives, propositions, and concepts, and he also makes spontaneous comparisons. His comments are practical and intelligent, and they indicate that he thinks about and understands real-life situations. For example, when we did the PPVT, Ron commented on a picture of hills "this is like the way to Jerusalem." Even more impressive is his tendency to share his ideas with others, to communicate with them. His mother related that when he overheard someone saying that a guest had put food in the wrong place, he remarked: "this is a tragedy."*

Ron began Grade One at a regular school when he was eight years old, and his curriculum included individual support. He managed to abide by the class rules and participated in classroom activities, improving his study and socialization skills. In her interview, Ron's mother stated: *"It is not that he became normal—he was completely different; floating and dreamy and delusional, but the children accepted him beautifully*." In addition, he made a significant effort to manage in his environment.

At the end of Grade One, each pupil was asked to write his own evaluation of his achievements before he received the school's report (based on the teacher's evaluation). Ron wrote*: "I am very good at reading, I am good at math, I am polite and behave nicely, and I have to improve my handwriting*." Interestingly, his self-evaluation matched exactly the school's report, representing a realistic self-perception and an accurate awareness of both his strengths and weaknesses.

During this year Ron moved forward on all the developmental milestones, closing the gap in his intellectual, emotional and social abilities. He was able to leave the pre-communication stage and started to develop new needs.

F. A need to communicate is present

Ron's need to communicate with others emerged gradually. The previous sections provided an account of his developmental trajectories, describing how he went from being an egocentric, non-verbal child who showed a limited awareness of others into a boy who sought to close the gaps in his interactions ("this is a flag"; "this is the flag of Israel") and share his impressions ("these are like [the hills] on the way to Jerusalem"). With the increase in Ron's linguistic abilities, the need to share with others was becoming more obvious. His social skills developed too, and school peers would come to play with him at home. Despite Ron's "dreamy" demeanor, the children liked him. They probably noticed his sensitivity, and the delicacy of someone with good intentions, even if he expresses them in somewhat odd, clumsy ways.

When Ron was in the second grade, he took science, as part of the class curriculum, and the children got a special project. Their assignment was to observe a natural phenomenon and prepare a written account of it. Ron chose to observe and follow his cats; below, we see a selection from the work:

Ron took many detailed photographs of his cats and presented them, with written descriptions of their activities. Highly attuned to detail, Ron depicted his cats in various positions and wrote short descriptions for each picture.

Below is his introduction:

Prologue

During the summer we moved to a new apartment.

At the old house we had a cat named Mitzi.

On the night we moved Mitzi got scared and ran from the house.

We looked for Mitzi everywhere but could not find her.

We were very sad!

One morning a new kitten appeared at our yard.

He was small and cute.

He was hungry and thirsty, and I gave him cat food and water.

I caressed him

And I named him Igor.

This way Igor became our new cat.

A month ago, Mitzi came back suddenly.

She was thin and dirty.

We take care and love them both

But they don't like each other!

Igor drives Mitzi away from the yard

All the time.

This is how a young autistic boy described a life-event that impressed him, concerning the cats that he loved dearly. In addition to submitting his scientific report of his observations on the animals' behavior in daily life, he also provided a brief summary of the events, including the family's emotions when Mitzi escaped, the way he treated Mitzi when she returned, and the relationship between his two cats.

Ron's awareness of all these features and eloquent presentation of them would be impressive for a normative nine-year-old, let alone for a child who had been diagnosed as autistic. Intensive mediation and appropriate, challenging educational placement had clearly made a significant difference in Ron's life.

When Ron was 10.5 years old, his mother reported yet further significant social progress: "He has begun opening his eyes to social life. He plays basketball, participates in a youth movement, and copes with situations as they come up. He is doing quite well at school, with the help of an assistant. "

Ron chose the book "Tom the Blue Cat."

When questioned as to his choice of book, Ron responded, "I like this story because it is interesting… and also because we can learn from it that we should honor each person, even if he is different, because everyone has something special in himself that should be appreciated."

Ron's choice conveys his need to connect with others, coupled with an awareness of being different and a desire to deal with these facts. His protagonist was not a superhero but rather a blue cat who struggled with rejection, courageously dealing with his difficulties until he found a way to be appreciated.

When Ron was 11.5 years old, his mother informed me:

> *Last year we saw a real breakthrough in his speech. This year It is fun to hear him speak. He is much more involved, really understands things, is listening more and is more interested. This week, I said that I am going to the doctor and he asked: 'Why mom, are you sick?'" and I was astonished, because up until that day he had not related in such a way"…"He has learned to accept and to give in return… he manages at school…yesterday he took a book to read in bed. It is the first time that he chose to read by himself.*

And the mother went on to say:

> *Socially, Ron is also managing quite well. Attends social activities after school where the children watch movies and talk. Spends much time with other children and they treat him very nicely. He also participates in a youth movement… He is very aware of his non-normative behavior, and he is making a big effort to overcome it.*

Thus, Ron was aware of his problems, and, with his parents' mediation and encouragement, continued to try to cope with them.

The following year, his mother stated:

> *There was a breakthrough in Ron's independence, with a wider span of social activities. He took a summer course, with normative children– most of them unfamiliar to him. He managed to integrate nicely, and he took part in the final play the group staged.*

At the age of 13, Ron was described by his mother as knowledgeable and involved in social activities. After a small social event during school hours to celebrate his birthday, his mother suggested that he return home with her afterwards, but the children said, *"Ron cannot leave because we need him for our science project!"*

Ron had a wonderful Bar Mitzvah celebration that year, planning every detail of the festivities himself. All his friends came, as well as his current and former teachers.

Ron finished grades 1-6, integrated in the same normative school, with the help of a support person during the last two years only. Based on the results of a thorough LPAD assessment at the end of the year, Prof. Feuerstein wrote the following: "A miracle has happened to this youngster; he achieved things no one believed he would be able to." He then recommended inclusion in a normative junior high school. Ron's mother told me: "No school agreed to integrate Ron, and he was finally placed in a small class of a high school." Ron attended this school for two years, but his mother stated that "Ron was very unhappy there and started losing his joie de vivre. Thus, when he entered Grade Nine, we decided to place him in a special education setting, which he attended from age 15 until the age of 21. They focused strongly on independence and self-help, such as travelling independently by bus, working, and acquiring skills for life. He continued to attend his youth group, where he was always warmly accepted. When Ron was 16 years old, his mother called me, saying:

> *Before his 16th birthday, Ron asked us to buy him an amplifier as his birthday present, because he wants to learn and become a DJ. He managed to convince us, and he finally got one! At the end of next week, he will have his first event in a home for elderly special people."*

It was especially exciting for the author of this paper to attend this event, which marked the closure of twelve years of working with Ron's family. In that decade-plus of observation, Ron grew from being an immensely challenged child into a self-confident young man who made things happen. He fulfilled his wish to give to others in need and share his music with them.

Two months later, Ron volunteered to play music in the breaks between lectures during a parental guidance seminar we held at the Feuerstein Institute. He came with his DJ equipment and he brought tears to the eyes of all the parents and professionals in the audience, when he started with the following words:

> Hello everybody!
>
> I am Ron, I am 16 years old, and I have been involved with the Institute since I was a little boy.
>
> My dream is to be a DJ at weddings and make people happy.
>
> In the meantime, I have a donated amplifier and I am trying to make people happy through music.
>
> I want to read a few words from a song by a singer whose songs I like, Then I will let you hear two of his songs.
>
> This is the way it is in the world, some things have passed
>
> And you won't know.
>
> Who are the people who hold the rules for hope?
>
> And if those thoughts come up,
>
> Don't ever despair,
>
> Because you have the good to change and further renew yourself."
>
> I'm happy to make you happy!

When Ron was 21 years old, he entered the National Service and lived in a hostel with a small group of young people. Ron's position was assistant maintenance person in a school, and he was so highly valued that they wanted to keep him on the job when he finished his service requirements. He also attended the two-year partnership and marriage preparation program.

This program is one of Feuerstein Institute's projects, designed to prepare and train young adults with special needs for forming intimate relationships. The topics covered include personal empowerment, communication, empathy, problem- solving, household management, budgeting, and couples counseling. It is founded on Feuerstein's idea that individuals with special needs have the right to lead as normal lives as possible, and that they should be prepared for family life.

Ron met his future wife; they started communicating, sending text messages, and talking. When she became his girlfriend, she told Ron's mother: *"I saw that Ron is so good and nice, and I did not want some other girl to catch him."*

The wedding was a true special event. Ron and his wife have been married for several years now, living in their own apartment. Both are working, taking enrichment courses, and living an independent life.

In a conversation with Ron's father, I inquired as to how the young couple manages on a day-to-day basis. He responded, "Ron became very independent, keeps things at home in order, and they are both getting along very well." Yet his father shared a concern: "Ron is not aware of his limits. He wants to learn to drive; He wants to become a certified electrician. He does not understand where he stands….”

According to Ron’s father, Ron continues to volunteer as a DJ "on special occasions, such as on a birthday that the community arranged for an orphan girl, on holidays, weddings and so on." I asked if he needs help with this, and Ron’s father responded: "No, he takes the equipment by taxi, sets it up, chooses the appropriate music, etc. He functions wholly independently in this regard."

In fact, Ron recently received a prize for his volunteer work.

At the end of a recent interview, I asked Ron's mother to share her current feelings:

> *Actually, I do not know; [while Ron was growing up] I was quite goal-oriented. I worked on having a normal family so that Ron would advance as much as he could. Driving him to school and treatments…I invested a lot in my daughter, being active in PTC's, in school projects…Our home was always open to friends and children…*
>
> *The points of light were that Ron kept advancing all the time, and this gave me strength and direction… and that all the staff helped…*
>
> *Even today, I haven’t totally relinquished my role: I encourage him to be involved, take classes; theater, music—his wife is learning to play the electric organ, and he is taking a course in home appliance repair. It is a professional course for the general population, and he organized it all by himself.*

Now, as I finished with my symbiotic role—I am taking a course on women's leadership, *work with parents of children with special needs and so on.*

"What advice would you give to other parents?" I then asked. She responded:

……In my work with parents of children with special needs, I have found that parents fall into one of two categories: those who take it as a challenge and deal with things one by one, as they come up, and those who cannot cope with the loss of their dreams….

Our meeting with Prof. Feuerstein was life-changing: he was the first to give us hope. Everyone else had told us "no and no and no."

And look at Ron: he is someone people expected nothing of, and just look at him now.

Note: All translations are the author's, unless otherwise noted.

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Effects of Intervention Using the Mediated Learning Experience (MLE) Approach on Modifiability of Individuals with Autism Spectrum Disorder: A Descriptive Case-Study

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Introduction

Considerable research efforts have been directed towards elucidating the behavioral, social, and cognitive atypical aspects of children with autism spectrum disorder (ASD). The central impairments characterizing children with ASD are deficits in social interaction and communication, and a set of repetitive and restricted behaviors (APA, 2013). Social deficits tend to be most pronounced in unstructured real-life social situations. The child with ASD is required to grasp quickly and intuitively what is going on around him/her and make quick predictions about what is likely to happen next, and what he/she should act upon in response to an event. Individuals with ASD tend to cling to inflexible routines and find even minute changes to them difficult to tolerate. From a cognitive point of view, several cognitive deficits have been proposed as central to autism, including problems of object permanence, language, and perception. It is now well known that individuals with ASD usually demonstrate difficulties in the social use of language, especially in conversation (Adams, et al., 2002; Baron-Cohen, 1989, 2009; Paul & Landa, 2008; Saalasti et al., 2008). For example, they show failure to engage in turn-taking during reciprocal conversations (Capps, Kehres, & Sigman, 1998), inappropriate judgments about

how much to say in conversational responses (Lord, et al., 2012), problems in taking another person's perspective (Loveland, et al., 1989), an inability to provide a relevant, adequate response to a conversation partner (Capps et al., 1998), and impairment in humor appreciation (Emerich, et al., 2003; Lyons & Fitzgerald, 2004). Other difficulties demonstrated are the inability to use social context to interpret the pragmatic meaning of sarcasm (Martin & McDonald, 2004), failure to interpret figurative expressions (e.g., Dennis, Lazenby, & Lockyer, 2001) as idioms (e.g., Norbury, 2004), metaphors (e.g., Norbury, 2005), proverbs (e.g., Tzuriel & Groman, 2017), and interpreting language from a literal perspective (e.g., Shaked & Yirmiya, 2003).

In the current paper, we present an exploratory descriptive study of a unique intervention with children with ASD that is based on the *Mediated Learning Experience* theory (MLE, Feuerstein, et al., 2002). The goals of the study were to demonstrate the effectiveness of the MLE approach in modifying both the cognitive and behavioral aspects of children with ASD. In the following, we briefly describe the MLE theory and its derived systems of dynamic assessment and intervention processes that guided us. Then, we consider the application of the MLE approach with children with ASD. Following these sections, we discuss our study, which was implemented on a small group of children with ASD treated by trained teachers at the Feuerstein Institute (FI).

The MLE Theory

The MLE approach towards treatment of children with ASD has been developed over the past four decades at the FI. It has been shown clinically to help many individuals on cognitive, behavioral, functional, and communicative levels. MLE processes convey a special quality of interaction between a mediator and a learner (Feuerstein, et al., 2002; Tzuriel, 2021). In MLE interaction, learning is carried out by means of a trained adult, who interposes him/herself between the child and the world of stimuli. The mediator

presents stimuli to the children while modifying the frequency, order, intensity, and context of the stimuli. He/she seeks to arouse in the children curiosity, vigilance, and perceptual acuity, and to improve and/or create in the child the cognitive functions required for temporal, spatial, and cause-and-effect relationships. MLE processes are gradually internalized by the child and become an integrated mechanism of change within him/her. Adequate MLE interactions facilitate the development of various cognitive functions, learning sets, mental operations, and strategies. The internalized MLE processes allow developing children to use them independently later, to benefit from learning experiences in diverse contexts, and to modify their cognitive system by means of self-mediation. The more the child experiences MLE interactions, the more he/she can learn from direct exposure to formal and informal learning situations, regardless of the richness of stimuli they provide.

Feuerstein et al. (2002) suggest 12 MLE strategies, but only the first five were operationalized and observed in interactions of mother-child (e.g., Klein, Weider & Greenspan, 1987; Klein, 1988, 1996; Lidz, 1991, 1995; Tzuriel, 1999, 2001, 2011, 2013; Tzuriel & Caspi, 2017; Isman & Tzuriel 2016; Tzuriel & Shomron, 2018), peer-assisted learning (e.g., Tzuriel & Shamir, 2007, 2010), siblings (Klein, Zarur & Feldman, 2002; Tzuriel & Hanuka-Levy, 2014), and teacher-student instruction (e.g., Tzuriel, Kaniel, Zeliger, Friedman, & Haywood, 1998; Tzuriel & Remer, 2018). The first five MLE strategies that were operationalized for research are as follows. These strategies were used in the current study:

(a) *Intentionality and Reciprocity (Focusing)* refers to a mediator's deliberate efforts to change a child's attention, awareness, perception, processing, or reaction. Mediation for Intentionality alone is inadequate without the child's reciprocity. Reciprocity is defined as the child responding vocally, verbally, or nonverbally to

the mediator's behavior. For instance, Intentionality and Reciprocity are observed when a caregiver intentionally offers a toy to a child or verbally focuses a child's attention on some aspect of the environment and the child undeniably responds. This criterion is considered crucial for the "ignition" of the mediation process and later for development of feelings of competence and self-determination.

(b) *Mediation of Meaning* refers to a mediator's response that conveys the affective, motivational, and value-oriented significance possessed by the presented stimuli. This can be expressed verbally by explaining the present context, relating it to other events, and emphasizing its importance, or nonverbally by facial expression, tone of voice, repetitious actions, and rituals. According to MLE theory, children who experience mediation of meaning will actively connect future meanings to new information rather than passively wait for meaning to appear.

(c) *Mediation of Transcendence* refers to interactions in which the mediator provides both the immediate or concrete needs of the children and attempts to reach additional goals that are beyond the specific situation or activity. In mother-child interactions, the mother may go beyond the specific experience by teaching strategies, rules, and principles to generalize to other situations. For instance, in a play situation, the mother may mediate the rules and principles that direct a game and generalize them to other situations. Mediation for Transcendence depends on the first two criteria, that is, intentionality/reciprocity and meaning, though the combination of all three criteria enhances the development of cognitive modifiability and expands the individual's need system.

(d) *Mediation of Feelings of Competence* is observed in interactions in which a mediator conveys to a child that he or she is capable of functioning both successfully and independently. The mediator may organize the surroundings to supply opportunities for success, interpret them to the child, and reward attempts to master the situation or deal with problems efficiently.

(e) *Mediation of Regulation of Behavior* refers to interactions in which a mediator regulates a child's reaction, depending on the child's reactive style and the task demands. The mediator may either reduce impulsivity or accelerate the child's behavior. Regulation of behavior can be mediated in various ways, such as arousing awareness to task characteristics and suitable responses, analyzing the task components, modeling of self-control, and providing metacognitive strategies.

MLE processes are considered as the proximal factor that explains cognitive modifiability. *Cognitive modifiability* is defined as the individual's propensity to learn from new experiences and learning opportunities and to change one's own cognitive structures. In some respects, Feuerstein's MLE theory is akin to Vygotsky's (1978) concepts of the *zone of proximal development* and *internalization* and the concept of *scaffolding* (Wood, Bruner, & Ross, 1976), which have captured the interest of many developmental psychologists and educators (e.g., Rogoff, 1990; Valsiner, 1987; Wertsch, 1985).

The MLE approach, explored extensively in relation to cognitive modifiability (i.e., Feuerstein et al., 2002; Tzuriel, 1999, 2001; 2013, 2018, 2021), integrates cognitive, social, and behavioral development, as well as dynamic assessment (DA) and various psychotherapeutic and cognitive interventions. The main organizing concept for this approach is *social cognition*, which presents ways of bringing MLE processes into the therapy for children with ASD.

Application of the MLE Approach with Children with ASD: Unique Principles

The use of the MLE approach with children with ASD is based on three main principles.

(a) The first is the system of MLE criteria described above.

(b) The second principle that guides treatment is that the diagnosis of ASD is often inaccurate, ambiguous, and made too early, before developmental and behavioral capacities have sufficiently matured. Once the child is labeled (many times prematurely), there is a tendency to limit efforts for effective interventions. The MLE approach, by contrast, focuses on behavioral, cognitive, and emotional characteristics that can be modified rather than on labeling the child. This approach also encourages the development of environmental conditions to pave the way for the application of MLE.

(c) The third principle of the MLE approach is related to focusing on glimpses of normative behaviors rather than on non-typical behaviors. Feuerstein labeled these behaviors as "isles of normalcy." For example, one can observe that, despite many difficulties and symptoms, children with ASD show even for a short time functional behavior (e.g., a child with non-existent eye contact suddenly looks directly at her mother when she starts to sing to her). The role of the mediator is to expand and strengthen the "isles of normalcy," or even create new conditions in which she can mediate effectively.

Goals of the Study

The goals of the current study are:

(a) To evaluate changes in *mediated learning experience* strategies during a year of intervention using the MLE approach

(b) To evaluate changes in behavioral characteristics of children with ASD during a year of intervention

(c) To evaluate cognitive modifiability of children with ASD, using the Learning Propensity Assessment Device (LPAD, Feuerstein et al., 2002)

Method

Participants

The participants are 9 children diagnosed with ASD who were treated at the FI using the MLE approach. The children were divided into two groups: Low Functioning (LF) and High Functioning (HF). The classification was made by the children's teachers and was based on a clinical assessment of their communication, behavior, and cognitive level. The HF children (n = 4) were relatively verbal, integrated into regular school and are literate. However, they still struggle with social relationships and suffer from anxiety around changes in routine. The LF children (n = 5) were non-verbal and their behavior was more likely to be characterized by motor or verbal stereotypies (repetitive / ritualistic movements or utterances).

At the start of the project (May 2017), the sample was composed of 9 children diagnosed with ASD. At the second assessment stage (November 2017), three of these left the program and therefore dropped out of the research project. At the same time, three new clients who had begun treatment joined the research. Therefore, the final sample included 9 children (age range 3 years to 15 years).

Measures

Observation of Mediation Interaction (OMI)

The *OMI* (Klein, 1988, 1996) was originally developed for observation of parent-child mediated learning interactions with infants and toddlers and was later adapted for observation of kindergarten children (e.g., Isman & Tzuriel, 2008; Tzuriel, 1999; Tzuriel & Ernst, 1990; Tzuriel & Caspi, 2017), teacher–child interactions (Tzuriel, et al., 1998; Tzuriel & Remer, 2018), and peer–mediation interactions (e.g., Shamir & Tzuriel, 2004; Shamir et al., 2006, 2007; Tzuriel & Shamir, 2007). The OMI is based on five behavioral categories that represent the five MLE criteria: intentionality and reciprocity (focusing), meaning (affecting), transcendence (expanding), feelings of competence (rewarding), and regulation of behavior. Each mediation category was operationalized in terms of mutually exclusive specific behaviors. Interactions are recorded, and behaviors of tutors and tutees are coded in relation to the other's behaviors and the meaning conveyed through these behaviors.

Autism Spectrum Rating Scales (ASRS)

The ASRS developed by Goldstein and Naglieri (2014) is a norm-referenced assessment designed to identify symptoms, behaviors, and associated features of the full range of ASD. The ASRS facilitates diagnostic decisions, treatment planning, program evaluation, and response to intervention. It includes items related to Autistic Disorder, Asperger's Disorder, and Specified and Pervasive Developmental Disorder-Not Otherwise Specified.

The questionnaire is composed of several sub-scales. The ASRS Total Score is the most inclusive scale (composed of Social/Communication, Unusual Behaviors and Self-Regulation), and the most reliable indicator of the extent to which an individual exhibits behavior associated with ASD. Nine additional Treatment Scales – Peer Socialization, Adult Socialization, Social/Emotional Reciprocity, Atypical Language,

Stereotypy, Behavioral Rigidity, Sensory Sensitivity, Self-Regulation and Attention – make up the DSM-IV Scale Score.

In the current study, we use the full-length ASRS (6-18 Years) designed for teacher's ratings. The authors reported satisfactory reliability and validity of the ASRS. Cronbach-alpha reliability scores range between .79 to .99 for the different scales.

Learning Propensity Assessment Device (LPAD).

The LPAD (Feuerstein et al., 1979; 2002) is a set of dynamic assessment measures aimed at assessing the learning propensity and learning profile of individuals. The examiner intervenes during testing to assist the examinee to use effective cognitive strategies, rules, and behaviors to arrive at the correct response. In the process, the examiner uncovers the child's impaired cognitive functions and selects the required intervention to maximize the child's potential. This approach does not provide an objective baseline and hence requires expert clinical administration in which mediation is provided only when necessary.

The HF children received four subtests from the LPAD: (a) Raven's Colored Progressive Matrices (RCPM) and Raven's Standard Progressive Matrices (RSPM) (Raven, 1956; Raven et al., 1998), (b) Progressive Matrices – Set Variations II, (c). Rey's Complex Figure Test (Rey, 1941), and (d) Associative Recall Test (Feuerstein et al., 2002). The LF children were not able to carry out the above tests, so a mostly play-based assessment was used instead, individually tailored to each child. Findings of the LF group are not reported in this article.

Raven's Progressive Matrices: Colored and Standard. The Raven's Colored Progressive Matrices (RCPM) is composed of three sets of problems, each containing 12 items. It starts with rather simple Gestalt completion and builds up to a complex functioning level, especially on items B8 to B12, which require abstract cognitive operations (i.e., analogies, permutations, logical multiplication). The Raven's Standardized Progressive Matrices (RSPM) is composed of five sets of problems, each containing 12 items. The items are on a higher level of abstraction than the items in the RCPM.

Progressive Matrices – Set Variations II (SV-II). The SV-II is composed of 5 subscales based on selected items from the RSPM (i.e., C7, C8, C12, D12 and E12). In each subscale, the child is presented with an example problem followed by six variations that are different in terms of content, but similar in terms of principles necessary to solve the problem. In each problem, there are eight alternatives for solution. The child must consider several dimensions and attributes to deduce the relationships and then select the correct answer. The SV-II requires many cognitive functions on the input, elaboration, and output phases of the mental act, such as systematic exploratory behavior, self-regulation, need for precision, specific verbal tools, spatial orientation, and hypothetical testing strategies.

Complex Figure Test. The Complex Figure Test (Rey, 1941) consists

of a reproduction of a complex geometric figure with 18 internal and external details. The administration procedure is composed of five phases: (a) reproducing the figure directly from the stimulus model (Copy I), (b) reproducing the figure from memory (Memory I), (c) teaching how to draw the figure, (d) post-teaching reproduction of the figure from the stimulus model (Copy

II), and (e) post-teaching reproduction of the figure from memory (Memory II). During the teaching phase, the child is mediated to produce the figure using efficient strategies of gathering information, planning the stages of performance (from whole to parts, directionality), using a systematic and analytic approach, and using precision in performance (proportions, details, line quality). Comparison performances of Copy-I to Copy-II and Memory-I to Memory-II provides an indication of the child's cognitive modifiability because of the intervention and provides information regarding how children benefit from MLE given within the DA procedure.

Associative Recall Functional Reduction (ARFR) Test. The ARFR test is aimed at assessing the individual's associative visual and memory skills, and the capacity to use reduced cues to retrieve information acquired by exposure to the stimuli and by its functional substitute. The test is inspired by Rey's Associative Recall test, but unlike Rey's version, in which the visual support is based on part-whole, in the functional recall version of the LPAD the visual support is based on functional relations. For example, the individual must think of the relationship between a pit and the instrument which digs it (hoe), or between the fire and the instrument that ignites it (match). The ARFR is composed of 8 phases: 1. Naming of objects, 2. Functional reduction-I. Then mediation of the relation between the original object, its functional reduction, and another new line to follow of a "trace" drawing. 3. Functional reduction II: "trace" drawing; a reduction drawn as a substitute for the functional reduction. 4. Functional reduction I: Changed order, 5. Functional reduction II ("trace"): with changed order, 6. First reduction repeat, 7. Free recall: Immediate and 8. Free recall: Delayed.

Procedure

Professional staff at the FI evaluated the participants using the measures detailed above three times[1]: at the beginning of the research project (T0), after six months (T1), and after a year (T2).

The ASRS was sent to the parents and therapists via Google Forms. To ensure accuracy, it was completed (to the greatest extent possible) over the telephone with a research assistant.

For the OMI, teacher-child and therapist-child dyads were videotaped during structured teaching sessions. Data was gathered from three types of dyads: teacher-child, speech pathologist-child and occupational therapist-child. It should be noted that the type of dyads was not necessarily similar for each observation and across the three measurements. However, for each child, we calculated the mean of the total number of mediation strategies which is based on all observed dyads. The analysis of the MLE strategies by the OMI was based on 10-minute interactions taken from the middle of each session. For each assessment, the teachers or therapists were asked to choose a similar style of task to ensure task consistency across observations. Interactions were analyzed by two observers, who were trained for 30 hours in rating MLE strategies and recording the frequency of each strategy. The training included theoretical understanding of the MLE strategies, as well as observing and analyzing videotapes depicting mediation processes. The LPAD assessment took place over several sessions and was carried out by a qualified therapist who administered the tests to all HF children.

[1] The participants who joined the research at the second stage did not receive an LPAD assessment.

Results

Observation of Mediation Interaction (OMI)

To assess changes in mediation intensity across the three assessments, we analyzed the incidence of each MLE strategy and the sum of Total MLE Score for each child. The Total MLE score is based on mediation strategies provided by all therapists and teachers. For each time of observation, we calculated the means of Total MLE Score. The findings indicate a decrease in the amount of mediation provided between T0, T1 and T2 (see Figure 1).

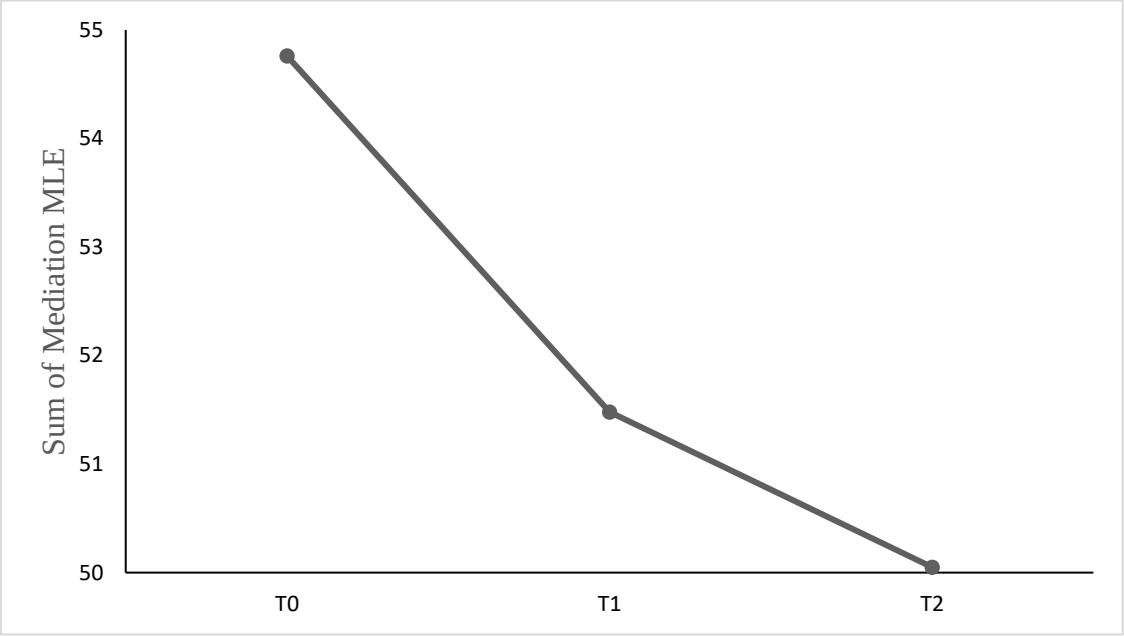

Figure 1: Mean of Total MLE Score at the Beginning (T0), Middle (T1) and the End (T2) of the Year.

To assess changes in the quality of the interaction, an analysis was made of the child's *responsiveness* to mediation (i.e., the degree to which the child responded to focusing- Intentionality and Reciprocity strategy) across the three assessments. The focus on *responsiveness* was important, as this factor was most prevalent in all the interactions. The findings showed that the HF children showed significantly more responsiveness than the LF children on the spectrum (see Figure 2). The degree of responsiveness of the HF children remained relatively consistent across the three assessments. The LF children, by contrast, displayed a low level of responsiveness at T0, but they made impressive improvement from T0 to T2.

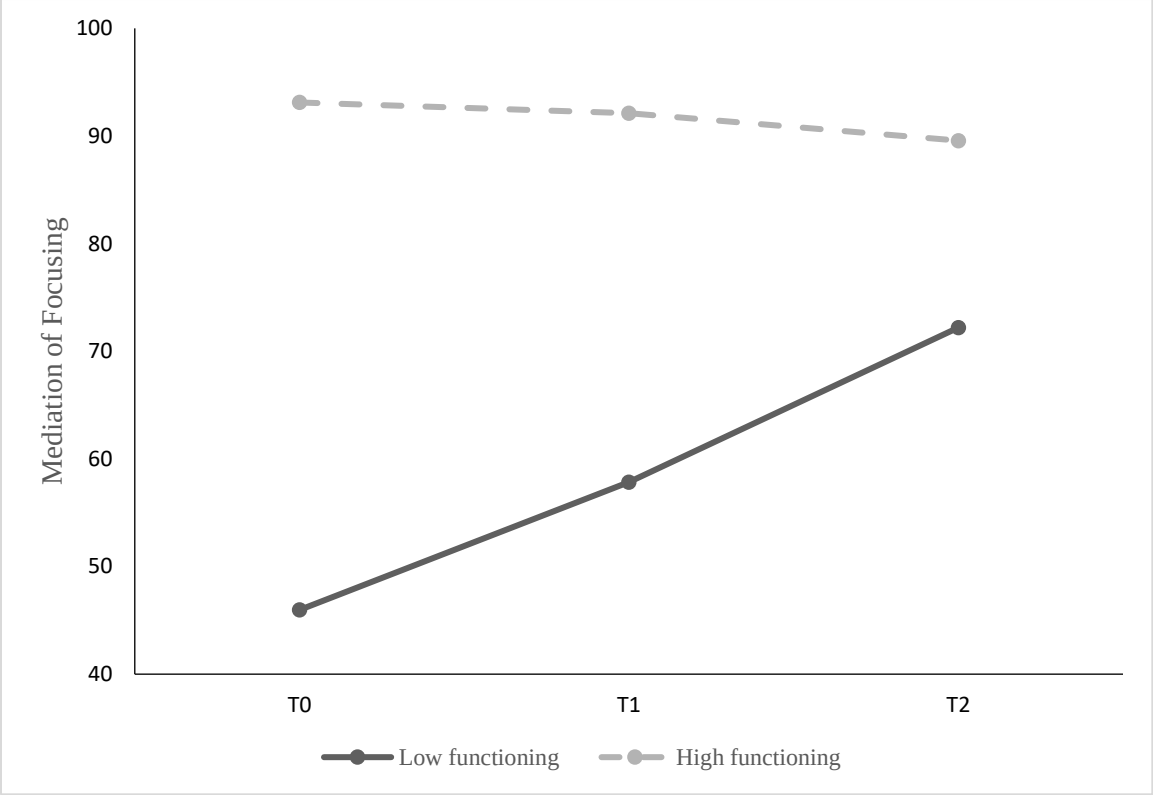

Figure 2: Percentage of Responsiveness to the Therapists' Focusing Mediation.

Autism Spectrum Rating Scales (ASRS)

To examine improvement in ASD symptoms over time, ASRS results were compared across evaluations as well as between parents and therapists.

ASRS Scale Total Scores

The ASRS scale was rated by both teachers and parents. The findings for the HF and LF groups are shown in Figure 3. In the LF group, ASRS Total Scale Scores decreased over time for both the therapists and parents (T1> T2> T3; see Figure 3). Over time, both parents and therapists saw fewer behaviors associated with ASD.

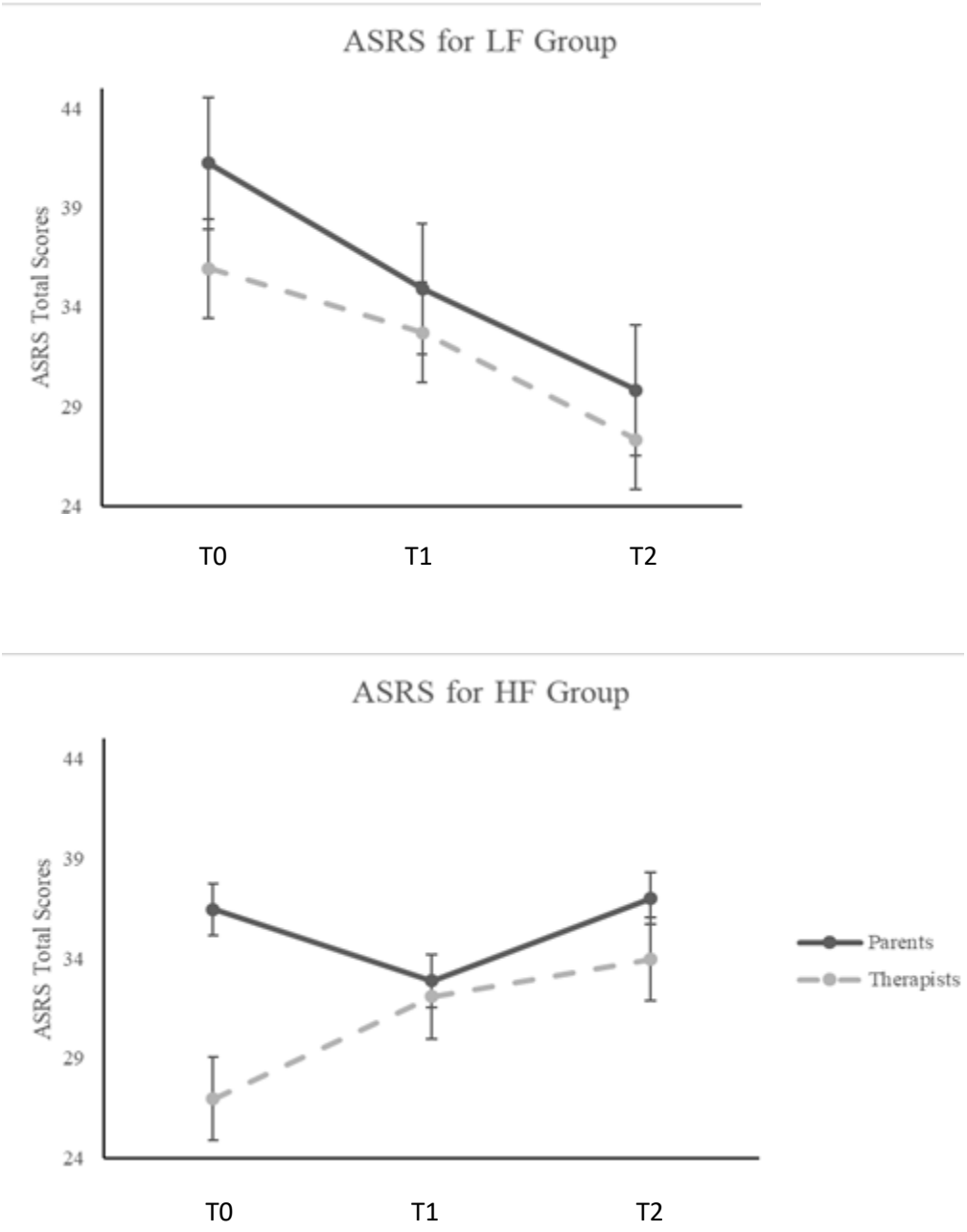

Figure 3: ASRS Total Score of the LF and HF Children.

In the HF group, the therapists' ASRS Total Scores increased over time (see Figure 3). In other words, contrary to our expectation, at T2, the therapists rated the HF children with more ASD-associated behaviors than in T0. The parents saw an initial improvement in symptoms from T0 to T1, but by T2, their scores had returned to the level they were at T0. Overall, parents awarded higher ASRS Total Scores than the therapists (i.e., they saw more ASD behaviors).

DSM-IV Scale Total Scores:

In the LF group, DSM-IV Scale Scores decreased over time. This means that both parents and therapists thought that the children exhibited fewer symptoms directly related to the DSM-IV criteria for an ASD disorder (see Figure 4A&B).

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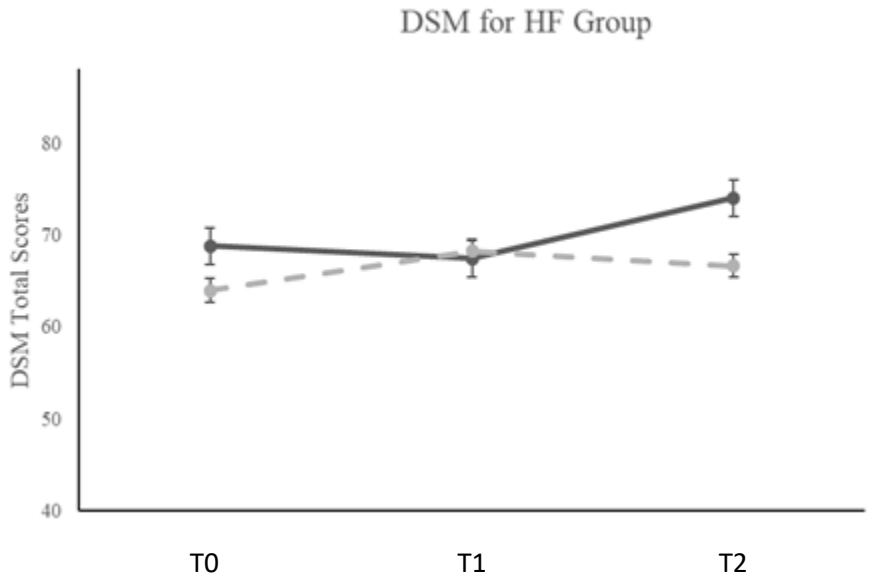

Figure 4B: DSM-IV Scale Scores of Parents and Teachers of HF Children

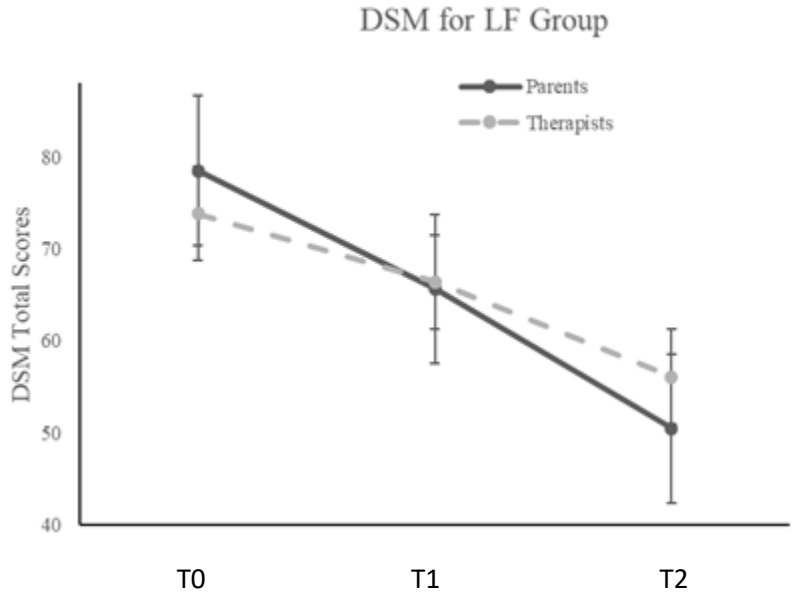

Figure 4B: DSM-IV Scale Scores of Parents and Teachers of LF Children.

In contrast to the findings of the LF group, in the HF group, the DSM-IV Scale Scores of parents increased over time. This means that over time, the parents saw an increase in the number of symptoms directly related to the DSM-IV criteria for a disorder on the Autistic Spectrum. For the therapists, the scores remain about the same across time.

Learning Propensity Assessment Device (LPAD)

The Raven's scores (administered within the LPAD) of two HF students (i.e., DG and SR) are presented in Figure 5. As can be seen, both students made progress on the Standardized Raven's Progressive Matrices (subscales C, D, E, and F) from the start of the year to end of the

year. No differences were found, however, on the Raven's Colored Progressive Matrices (subscales A, Ab, B).

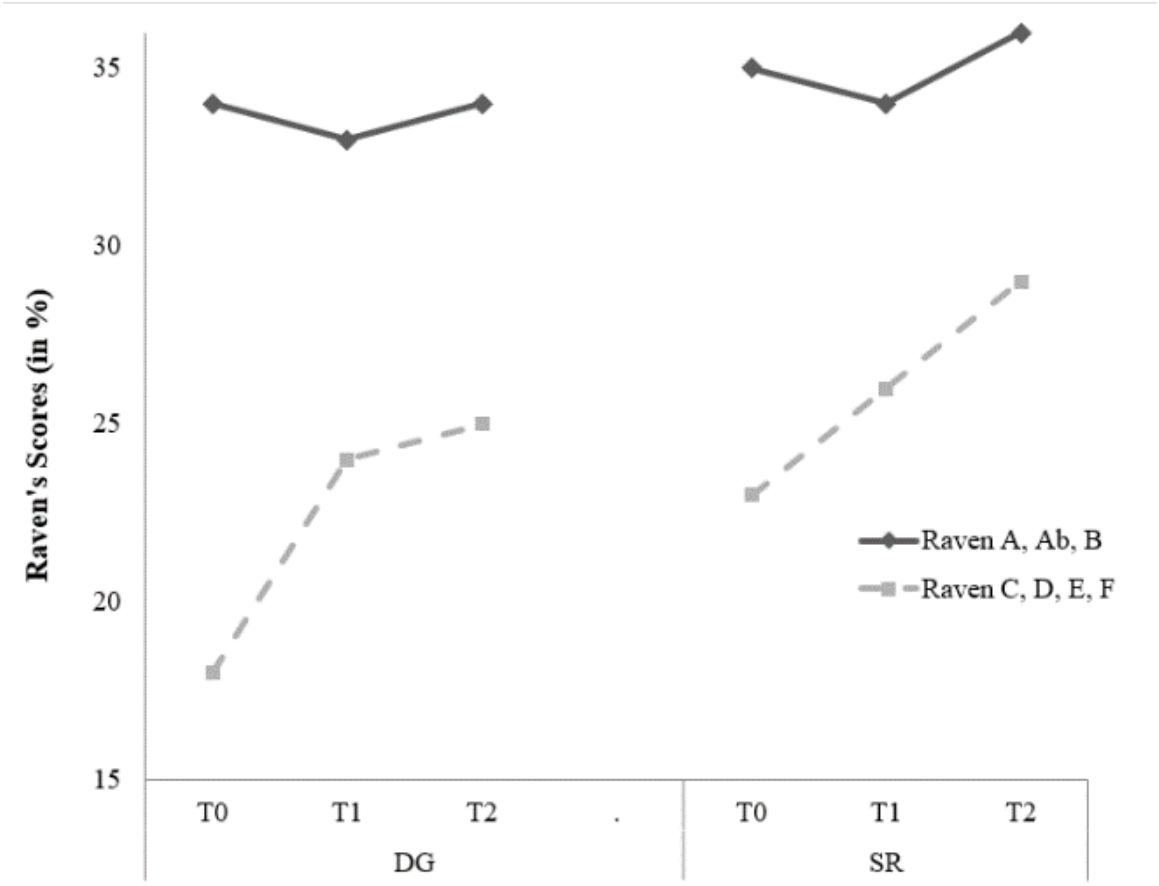

Figure 5: Performance of DG and SR on Raven's Tests on T0, T1 and T2.

The findings of DG and SR on the Complex Figure test administered within the LPAD are presented in Figure 6.

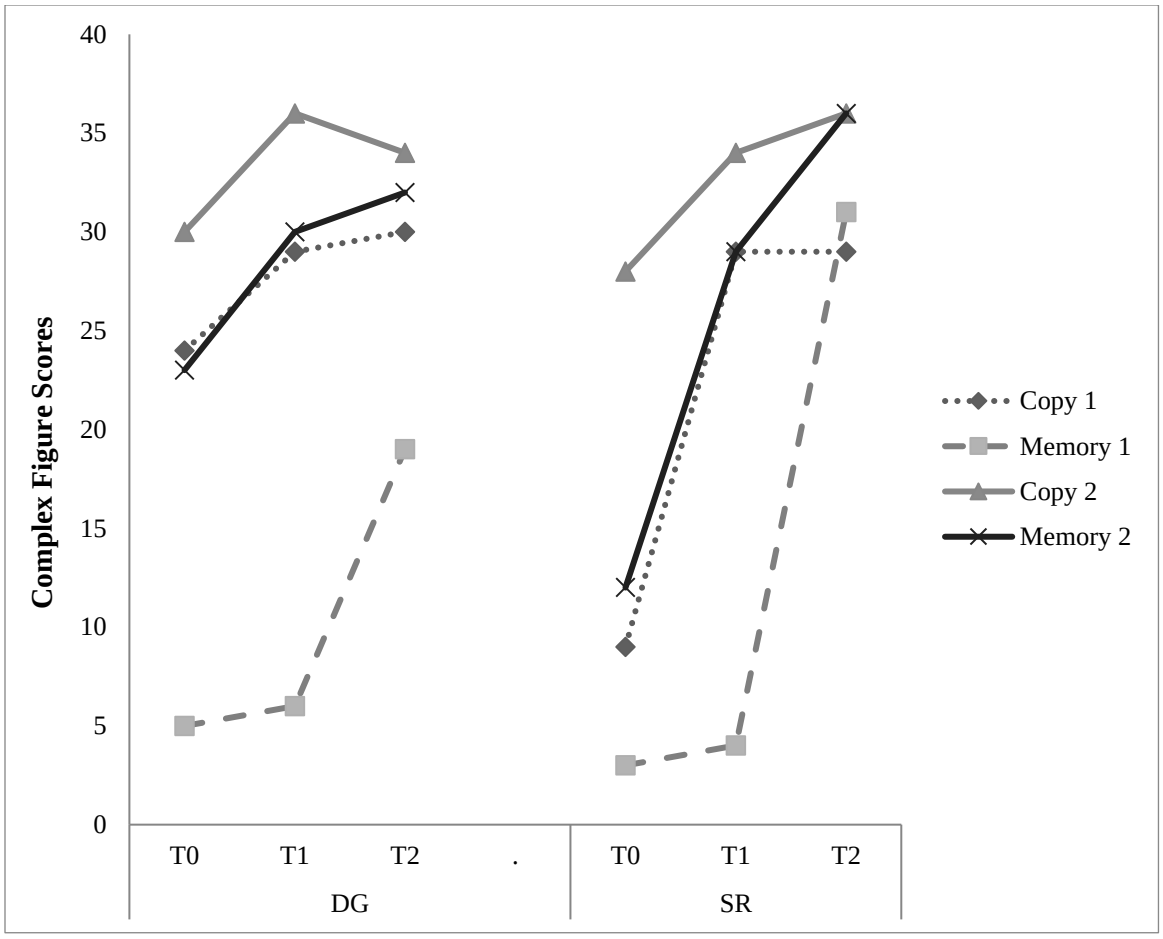

Figure 6: Complex Figure Scores of DG and SR in T0, T1 and T2.

The most impressive finding is the increase of scores on Memory 1 from T0 to T2 for both DG and SR. Another impressive increase is evident for SR on Copy 1 and Memory 2, from T0 to T2. There were also moderate increases in these scores for DG.

The findings on the Associative Recall: Functional Reduction test are presented in Figure 7. To simplify the presentation, we present the findings of 3 out of 8 stages of the test: Functional Reduction I, Functional Reduction II: "Trace," and Functional Reduction Changed Order. The patterns for other subtests are like those three subtests. As can be seen in Figure 7, SR showed an impressive increase in performance from T0 to T2, reaching a maximal score of 20 on T2, in all

three subtests. DG also showed improvement, especially on Functional Reduction I, though it was not as high as that achieved by SR.

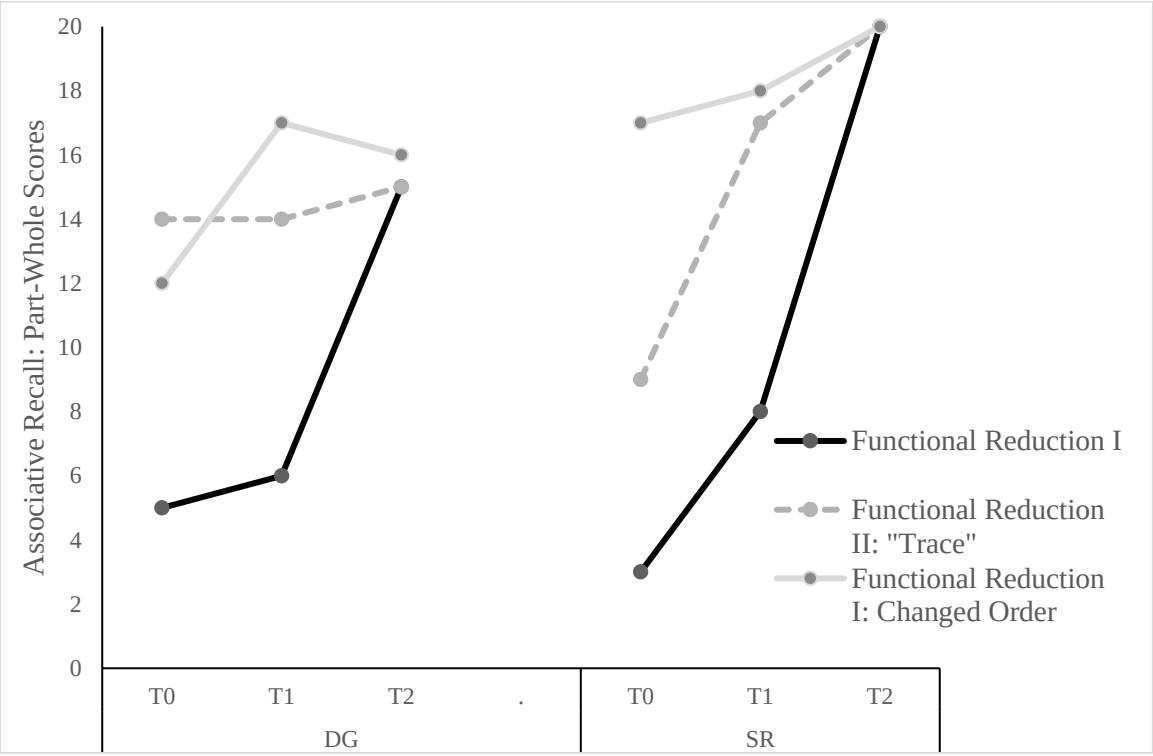

Figure 7: Associative Recall Functional Reduction Test Scores of DG and SR in T0, T1 and T2.

Discussion

Observation of Mediation Interaction (OMI). After closely monitoring the nine children over the research period, we found that all children required significantly less MLE intervention by the end of the year than at the start of the year (Figure 1). The implications of this finding are that by T2 and T3, the children were working more independently, their behavior was more regulated, and less prompting was necessary. Independent learning is one of the main goals of

MLE. The changes produced by the mediator-therapist are designed to lead the child to internalize learning strategies and become his/her own mediator (Feuerstein et al., 2002). In other words, the therapists succeeded in laying sufficient groundwork for the children's success that they were able to take a step back and allow the children to take the lead.

Another important finding relates to responsiveness to the focusing mediation (Figure 2). As expected, the LF children with ASD displayed much less responsiveness than the HF children did. However, comparison of the two groups across time showed a different pattern of change. The HF children demonstrated consistently high levels of responsiveness across all times and reached almost a maximal responsiveness. When a therapist addressed them, they almost always responded, be it verbally or motorically. Thus, a ceiling effect was observed from the very start of the year. In contrast, the LF with ASD group showed much less responsiveness to mediation of focusing at T0, but steady improvement over time. By T2, there was more interaction between the therapists and children, and less focusing was required to elicit a response in the child.

It should be noted that the HF children in the current research were treated at the FI prior to their inclusion in the research project. Therefore, the high ceiling might be related to the earlier intervention. Furthermore, it ought to be borne in mind that not every response elicited by a therapist was accurate and context appropriate. Finally, the interpretation of changes in responsiveness of the LF group should be approached with caution. There may have been even more response to mediation than initially thought amongst the LF children. Since most of the LF children are non-verbal and their behavior was apparently less purposeful, with many repetitive movements and utterances, it was difficult to interpret their movements as a response to

mediation. It would be fruitful in future research to ask the therapists to explain the nuances of each child's behavior and not rely solely on the observers' ratings.

Autism Spectrum Rating Scale (ASRS). Mixed results were found when we compared ASRS scores across assessments and between assessors. Parents as well as therapists reported greater improvement in symptoms and behaviors associated with ASD in the LF children. Yet, parents and therapists also reported an increase both in ASD-associated behaviors and in symptoms directly related to the DSM-IV criteria in the HF children. This finding could be attributed to higher expectations from the caregivers of the HF children. Small improvements in symptoms were more noticeable in LF children than with HF children. In other words, it seems that there was a tendency to praise the LF children at every small achievement. In contrast, for HF children, who can converse with relative fluency, small changes may not be as noticeable, and more may be expected from them. Another possible explanation is that the integrative condition may decrease the perception of small changes: HF children were integrated in regular schools and hence compared to typically developing children,

Overall, we found that the therapists rated the children more positively than the parents. The therapists awarded children lower scores on the ASRS, seeing fewer symptoms in the children than the parents. This finding may be explained by the fact that the therapists have a broader perspective as they treat multiple children with varying degrees of functioning. In addition, the parents who are with the child most of the day, probably experience more conflict times (e.g., mealtimes, cleaning) than the therapist, who sees the child only in structured situations. It is plausible that non-normative behaviors may appear more prominent to the parents. Research suggests that parent expectations may be more important than previously

understood. Support for this was found by Ivey (2004) and more recently by Thomas et al. (2018), who reported low parental expectation of the future outcomes for their children diagnosed with ASD.

It can be concluded that the MLE therapeutic intervention applied at the FI is particularly efficient for those children who are low functioning on the spectrum. This is particularly significant as many of those children (and parents) were told by other specialists that they would not see much improvement in the child.

When looking at the ASRS results, it is important to remember that the ASRS cannot replace experienced assessors' judgements concerning diagnosis (e.g., treatment plan or treatment evaluation). Furthermore, ASRS results are best understood in conjunction with other measures, through discussion with parents/caregivers and through direct clinical observation. Therefore, we included a combination of different measures in the study and carefully selected the therapists who would participate in the study, based on their years of experience and level of expertise. Collecting ASRS questionnaires from the parents as well as multiple therapists was especially valuable as ratings obtained from a combined variety of sources provide the most useful data. The fact that the therapists generally agreed when it came to assess the extent of problematic symptoms in the children further boosts the validity of our results.

We must also consider the impact of other influencing factors (e.g., social desirability bias, misunderstanding of content, and careless responding). Any non-statistically significant changes in score between assessments may result from random fluctuations in behavior or error in measurement. Another problem we came across was unanswered questions which limited the

amount of data we could gather on the lower-functioning children (this was mainly due to questions relating to speech which was not relevant for these children).

Learning Propensity Assessment Device (LPAD).

The LPAD findings clearly indicate improvement in performance from T0 to T2. Unfortunately, the findings were available only for 2 children in the HF group. Both children received high scores at each assessment on the *Raven's Colored Progressive Matrices* (Figure 5). The lack of improvement is attributed to a ceiling effect as both children solved more than 90% of the problems in T0. However, the findings on the *Raven's Standard Progressive Matrices* (which are much more difficult than the *Raven's Colored Progressive Matrices*) confirm our expectations for cognitive improvement on a measure considered to tap fluid intelligence. Both children showed dramatic changes from T0 to T2. The cognitive changes were also evident in measures reflecting planning behavior, such as the Complex Figure test (Figure 6) and associative recall of perceptual objects even after reduction of perceptual cues. Both children showed impressive modifiability of copying and memorizing a complex array of details as represented in the Complex Figure test. This was evident especially in the memory phase of the test. Interestingly, the same pattern of impressive improvement was found in the memory test, where both children were asked to memorize a functional reduction of the objects.

It should be noted that the findings of the current research are of an exploratory nature. Further research is necessary with a larger sample as well as with a control group receiving another type of intervention, such as cognitive behavior therapy. Nonetheless, the findings point to a positive trend of improvement across all the domains (MLE, ASD symptoms, and cognitive

modifiability) and support our expectations about the MLE approach with children on the autistic spectrum.

Conclusions

The findings of the current study clearly indicate that the MLE approach with children on the autistic spectrum was effective in reducing the amount of mediation required during one year of intervention and increasing the amount of responsiveness among LF children with ASD. Moreover, parents and therapists saw marked improvement in symptoms and behaviors associated with ASD in the LF children with ASD. As for the HF children, who can converse with relative fluency, small changes were observed, a finding which may be attributed to higher expectations from them which caused small changes to go unnoticed, as well as to the fact that being integrated in regular schools, they were constantly compared to the typically developing children, a situation that likely decreased perception of small changes. The cognitive changes as measured by the LPAD (findings available only on two children from the HF group) showed obvious improvement across different domains representing fluid intelligence, planning behavior, and memory skills.

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