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Concurrent use of Customized Behavioral Interventions in Skill Enhancement and Problem Behavior Reduction on Children with Autism

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Abstract

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Keywords:

Autism Spectrum disorder,
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 behavior.

This study examines simultaneous reduction of problem behavior and enhancement of skill behaviors in eight children on autism spectrum, who underwent a randomly blinded baseline assessment on indigenously standardized scales before being subjected to behaviourally based interventions. Despite overall change in behavior, test scores failed to show significant differences. Domain analysis showed gains for 'sensory' items under skill behaviors and reduction of 'temper tantrums', 'hyperactivity' and 'rebellious behavior' under problem behaviors. Skill behavior scores appear to be inversely correlated to problem behavior. The results are discussed in the light of their utility to optimise benefits for children with autism.

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The efficacy of individualised behavioral interventions in facilitating clinically significant gains in intellectual, language, social, emotional and adaptive functioning of children with autism has been severally demonstrated against matched control-groups receiving other biological, nutrition/diet based, bio-medical, instrument-assisted or eclectic treatments (Cohen, Amerine-Dickens, & Smith, 2006; Howard et al. 2005; Beadle-Brown, Dorey & Murphy, 2004; Anderson & Romanczyki, 1999). The location of these interventions have varied from homes (Anderson et al. 1987), mainstream preschool and kindergartens (Eikeseth, Klintwall, Jahr, & Karlsson, 2012; Eikeseth, Smith, Jahr, & Eldevik, 2002) to community-based settings (Stahmer, Collings, & Palinkas, 2005). Studies have also explored the viability of using parents as co-therapists (McConachie & Diggle, 2007; Smith, Buch, & Gamby, 2000; Holmes, Hemsley, Rickitt, & Likierman, 1982; McClannahan, Krantz, & McGee, 1982).

Behavioral interventions applied on children with autism cover two aspects: (a) acquisition, maintenance or enhancement of positive asset driven skill behaviors; and, (b) reduction, elimination or extinguishing of negative problem behaviors. Whereas 'behaviors' are defined as 'observable and measurable actions', they are assumed to be learned due to environmental contingencies by which they get elicited and maintained. By the same school of thought, every behavior is understood to serve immediate functional-utilitarian purpose for the organism, which when analysed become the basis for engineering behavior change programs. There are antecedent driven and/or consequence controlled behaviors whose precise manipulation is the essence of 'Applied Behavior Analysis' (ABA) programs that have been tried successfully on children with autism (Matson et al., 2012; 1996). Ideally, behavioral interventions come from research-based organizations and are implemented by certified experts. A few reasons why such programs may fail could be that the treatment is not sufficiently intensive and the intervention period is too brief or even that it does not meet the standard in terms of program quality (Reichow, 2012; Humphrey & Parkinson, 2006; Gresham & MacMillan, 1998; 1997).

Despite the apparently overwhelming evidence favouring behavioral interventions, critical methodological issues related to research design, randomisation, heterogeneity of sample populations, case controls, recovery indices, measurement issues, generalization, and

outcome evaluation involved in such studies have been raised (Kuppens & Onghena, 2012; Dawson et al., 2009; Matson & Smith, 2008; Matson, 2007; Hume, Bellini, & Pratt, 2005; Charman & Patricia, 2003). There appears to be a subset of children whose response to such interventions includes achieving a level of functioning that is indistinguishable from typically developing peers (Granpeesheh et al., 2009b). There is need for evaluating the effect of treatment intensity on treatment outcomes, and how these outcomes vary by age (Granpeesheh et al., 2009a). Issues related to cost-benefits in terms of behavior intervention services, its implementation and teacher or therapist training, how to integrate it with other treatments and how best to fill the gaps between research and practice have also been posited (Jacobson & Mulick, 2000). There are controversies regarding who responds best and to what degree. Despite the widespread notion that these programs result in long term benefits for the child with autism, there are marked holes in our knowledge largely due to methodological considerations (Matson et al., 2012a).

Research on behavior change programs in children with autism has generally proceeded along two independent mutually exclusive streams. They focus either on target skill behaviors, such as, communication (Laski, Charlop, & Schreibman, 1988), social skills (Hwang & Hughes, 2000; Laushey & Heflin, 2000; Rogers, 2000; Pierce & Schreibman, 1995), play (Solomon, Necheles, Ferch, & Bruckman, 2007; Kasari, Freeman, & Paparella, 2006; Stahmer, Ingesoll, & Carter, 2003; Thorp, Stahmer, & Schreibman, 1995), cognitive domains (Ingersoll & Schreibman, 2006) or they seek to address on reduction of problem behaviors (Macintosh & Dissanayake, 2006; Campbell, 2003; Horner et al., 2002). Ideally, there is need to combine, integrate and develop a holistic approach to behavioral interventions. Remediation must target decrement of problem behaviors with simultaneous increment in scores of skill behaviors for individual or groups of children. Against the background of this need, rationale and justification, it was the aim of this study to examine the feasibility, efficacy and benefits of a customised, time bound and synchronized behavioral intervention in ameliorating the behavioral repertoire on a treatment group of children on the autism spectrum. The specific objectives of this study were:

- To identify, list and record a baseline of the different types and specific instances of problem behaviors as distinct from deficits in their skill behaviors in children diagnosed as autism;
- To evolve and implement a combination of individualized and/or small group based interventions targeting identified behaviors in children with autism for specified time frame and/or across envisaged sessions in home or school settings;
- To evaluate the effect of the intervention on different types and specific instances of skill and problem behaviors in home or school settings in children diagnosed with autism; and,
- To establish the reliability and validity indices of the selected indices.

Method

The study used pre test post test comparative intervention-cum-correlation research design covering the period of data collection between June-July, 2013. The key terms used in this enquiry are: 'Concurrency', 'Behavioral Intervention' and targeted variables are: 'skill behavior' and 'problem behavior' as applied on a clinical sample of children with autism.

Operational Definitions:

- (a) Concurrency: Concurrency, as used in this study, is simply the co-occurrence of two or more events or variables simultaneously at the same time, in the same location or in the same children with respect to their 'skill behavior' and 'problem behavior'.
- (b) Skill & Problem Behaviors: Skills or adaptive behavior contrasts maladaptive, dysfunctional, non-productive problem behaviors. It is age appropriate behavior

necessary for an individual to function safely and independently in daily life. Specific examples include competency in performing skills related to sensory, fine or gross motor tasks, activities of daily living, such as, eating, dressing, grooming, toilet care and personal hygiene, communication, social-play, community orientation, academics, etc. Problem behaviors, on the other hand, are negative, undesirable, maladaptive, or challenging although observable-measurable actions of people which may be deemed as not being age or situation appropriate, unproductive, interfering in their learning of new behaviors, harmful to self or others, occurring in magnitude sufficient to cause stress to others (Venkatesan, 2004). Typical categories of such behaviors are: 'violent and destructive', 'self injurious', 'odd', 'antisocial', 'repetitive', 'temper tantrums', 'misbehavior with others', 'anxieties or fears', 'hyperactivity and rebellion' (Peshawaria & Venkatesan, 1992a). Of course, there cannot be a single universal classification of these categories. Nonetheless, behaviorists insist that all behaviors are learned as a function of the utility, benefits or contingencies they secure for an individual either immediately before or after the occurrence of such behaviors. In holding so, the behaviorists enunciate a specialized form of assessment of overt observable-measurable actions as precursor to planning behaviourally based interventions for the affected individual or groups of such individuals (Peshawaria & Venkatesan, 1992b).

Participants

The study covered 8 children (Age Range: 3-6 years; Mean: 4.97; SD: 0.98) including 5 boys and 3 girls diagnosed with autism without any co-morbid conditions. The ICD-10-CM official criteria (WHO 2012) was followed in classification or categorization of cases in this study. They were drawn on the basis of convenience sampling from one special and two mainstream schools located in Mysore, Karnataka.

Instruments

1. The ACPC-DD (Venkatesan, 2004) is a standardized behavior assessment device to elicit systematic and comprehensive information on current level of skill behaviors in preschool aged children (0-72 months) with developmental disabilities. The tool consists of 400 items distributed evenly across 8 behavioral domains relevant to daily activities of such infants, toddlers and preschoolers, viz., Sensory, Gross-Motor, Fine-Motor, Communication, Play, Self-Help Activities, Cognitive Activities and Pre-academics. The specific number of items under each domain is intentionally fixed at 50. Every activity/item is written in clearly observable-measurable terms to avoid confusion in understanding or interpreting them. The items at each age level/domain are located in an increasing order of difficulty/complexity such that more items are passed at lower levels than at higher levels on the tool. The tool also serves as a curriculum guide and has been field tested with adequate internal, external and concurrent validity ranging between 0.86-0.92. As per the procedure laid down for administration of ACPC-DD, each child was assessed and a behavioral profile of assets/deficits (i.e., behaviors s/he "could" and/or "could not" perform) are enlisted as baseline through direct observation, interview of parents/caregivers or as details available from other reports. If the child 'could perform' a given item, it was ascertained as to what level s/he can perform that item scored between 0-5 subject to a maximum score of 250 under each domain and 2000 on the whole for any given child assessed on this tool. In short, along with its semi-structured interview format and recording sheet the tool enables an individualized case-by-case topological mapping of situations, triggers, antecedents, functions, maintaining aspects and consequences for the identified problem behaviors as observed in home or school settings for the children diagnosed as autism;



2. The PBSS consists of 100 items grouped under 11 domains. While the PBSS shares part of its appearance, scoring, recording, profiling and report generation with BASIC-MR, Part B (Peshawaria & Venkatesan, 1992a), there are also many other new features. The scoring of each child on PBSS is carried out on two counts: 'Frequency Count Score' (FCS) based on presence or absence of given problem behaviors; and 'Intensity/Severity Count Score' (I/SCS) of problem behavior for a given child. The former is marked as 'present' (score: one) or 'absent' (score: zero). The latter is calculated on a 3-point rating scale: 'never' (score: zero), 'occasionally' (score: one), and 'frequently' (score: two). Thus, the maximum possible FCS on PBSS is 100 and I/SCS is 200 for a given child. The inter-rater reliability coefficient for PBSS is reported as 0.91 ($p < 0.001$) and 3-week test-retest reliability is 0.89 ($p < 0.001$).

Procedure

Each child included in this study underwent baseline (BL) assessment on ACPC-DD and PBSS before a short list of 5-10 behavioral objectives simultaneously covering, both, skill and problem behaviors (if any) was identified for a clinic and home based intervention module. For example, targeted skill behavioral objectives for a given child could include: 'throws ball in specified direction', 'colours within a template', 'points to body parts', 'follows functional command come-go without being associated with gestures', 'transfers liquids between containers', etc. Instances of problem behaviors marked for intervention were: 'screams', 'falls on the floor', 'hits others', 'throws things', 'pinches others', etc. Although there was a provision to record instances in the scoring sheet wherein a child did not show any problem behavior, there was no occasion to use it since all the children included in this sample had one or the other of them. The program was implemented simultaneously in the clinic as well as home settings in a coordinated manner.

Supporting verbal and written guidelines on how to train the child on the chosen target behaviors or managing problem behavior, simple or pragmatic record keeping procedures, behavioral techniques to be implemented, biblio-therapeutic materials, reward or incentive systems to be used, etc., were also given to each enlisted caregivers. Teaching aids/materials relevant to the chosen behavioral objectives were exemplified. Written instructions accompanied the verbal explanations such that record keeping was simple, pragmatic, direct and immediate during home training. The standardized "toy-kit" to go with ACPC_DD (Venkatesan, 2012; 2010) was also used as part of this program. There was at least one follow up in 4 weeks ranging for a period of two months. The entire intervention was implemented across 12 structured sessions including 4 sessions of group work. The behavioral achievements of each child was recorded during every follow up along with information on items not achieved or those marked as "ongoing" activities for further training.

The scores on the two checklists were compiled into discrete or meaningful categories during data analysis and statistical treatment. To determine covariance between acquisitions of skills as reflected on ACPC-DD and decrement of problem behaviors as measured on PBSS, correlation coefficients were calculated. By consensus, based on content and directionality, the classification, categorization and cataloguing of raw data on reported behavior changes vis-à-vis children with autism was carried out by 3 independent mutually blinded raters including the parent, teacher and therapist. The inter-rater reliability exercises measured range of 95.6-97.2 across the three respondents.

Behavioral Interventions

This intervening variable in this study involved strategies that enable children to acquire certain behaviors to cover deficits and/or tone down excesses in a typically contrived environment before such changes are generalized. The emphasis was on analysis of here-and-now antecedents and/or consequences, which when identified and manipulated was used to

alter any given behavior. Key elements in effective behavioral interventions typically included involvement of parents, peers and significant others as co-teachers or co-therapists, adoption of certain characteristic teaching methods, covering the particular curriculum spread across different environments, multiple settings, levels and variety of skills, and simultaneously addressing reduction of aberrant behaviors. The ground techniques involved use of rewards, careful selection of instructional materials and procedures like environmental manipulation, operant techniques like shaping, chaining, prompting or fading, contingency contracting, token economy, time out, extinction, etc. The stress was on customised or individualized instruction. Thereafter, the children as well as the caregivers were continuously shadowed across real-life settings like school, home or community to achieve transfer of learning and generalization, integration and mainstreaming.

Broadly, the 8-week long customised behavioral intervention spread over 12-one hour sessions in home, school and therapy settings comprised of one-to-one as well as small group based sessions using procedures derived from ABA, environmental manipulation, direct instruction on identified individual skill deficits, structured teaching and parent guidance covering play, receptive-expressive communication, sensory-motor, pre-academics and self help activities. For any given session, the focus was on the targeted skill behavior chosen for intervention for a given child or that group of children. For example, is 'pointing to self' was the mainstay during a session all the activities, procedures and practices used in that session or for that group of children involved the use of behavioral techniques like shaping, imitation, prompting, rehearsal, guidance or verbalizations related to that targeted preverbal skill. An exclusive and simultaneous focus was laid on identification and management of problem behaviors wherever present in each child. This was carried out by listing the observed or reported problem behaviors, prioritizing, analysing their antecedents and consequences, mapping their perceived 'causes' and/or ongoing 'handling' strategies, eliciting the constraints involved in implementation of home based programs, etc. The overall long term objective of the intervention program was to enable the targeted children to internalize what is being trained or remedied and thereby reach a level of sufficient independent mastery. Similarly, the locus of control was not to be an external parent, school, teacher, parent or therapist driven initiative, but more of internally self-driven behaviors in the caregiver as well as the child.

The specific skill training procedures or techniques used in this study included activity scheduling, task analysis, prompting, shaping, chaining, fading, reinforcement, contingency contracting, token economy, modelling, etc. The individualised remediation techniques implemented after functional analysis of each problem behavior included extinction, differential reinforcement, time out, physical restraint, restitution or overcorrection, conveying displeasure, etc. Additional guidelines given to parents on home based program applications included resolving disagreements between caregivers, enabling them on correct identification of functions underlying specific problem behaviors, recommending them to desist against use of ad hoc, arbitrary or counter-productive techniques like false inducements, nagging, pleading, begging or bargaining with children. Counselling focused on assuaging doubts and elimination of felt or reported sense of guilt in few parents to use certain behavioral techniques (Humphrey & Parkinson, 2006; Gresham & MacMillan, 1998; 1997; Peshawaria & Venkatesan, 1992b; Lovaas, 1987).

Results & Discussion

The results are presented and discussed sequentially under the following heads:

(a) Comparative Pre and Post-treatment Scores on Skill & Problem Behaviors

A comparative pre to post-treatment scores (Table 1) and their percentage gain (or increment) in skill behavior scores and/or concurrent percentage decrement of scores for problem behaviors as reported across informants (Table2) is given with graph (Figure 1).



Table 1
Comparative Pre and Post-treatment Scores on Skill & Problem Behaviors

Score (N: 8)	Skill Behaviours		Problem Behaviours Intensity Score						Problem Behaviours Frequency Score					
	Baseline	Final	Baseline			Final			Baseline			Final		
			P	T	Th	P	T	Th	P	T	Th	P	T	Th
Total	8192	8878	321	391	371	246	255	247	225	246	236	200	214	208
Mean	1024	1109.8	40.1	48.9	46.4	30.8	31.9	30.9	28.1	30.8	29.5	25	26.8	26
SD	142.9	147.6	16.9	14.2	12.7	16.0	9.2	8.8	8.7	7.7	6.3	10.4	6.2	5.7
p-value	T: 1.18; df: 14; p: 0.26		X2: 2.21; Df: 2; p: 0.3312						X2: 0.03; Df: 2; p: 0.9851					

(Note: P: Parent; T: Teacher; Th.: Therapist)

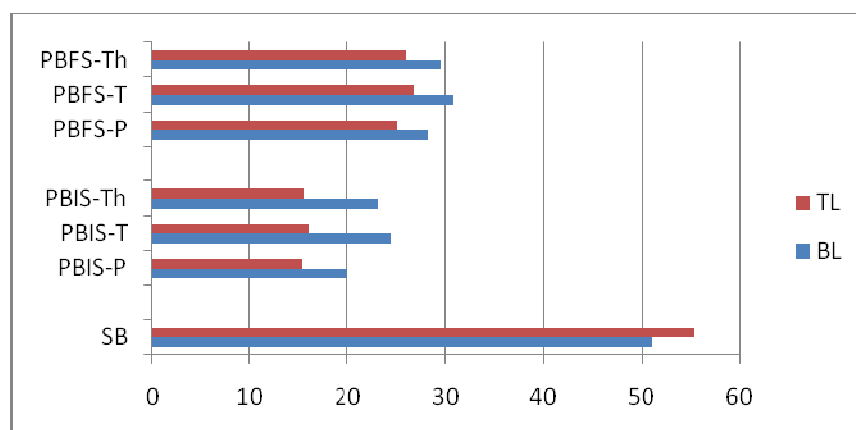
The BL mean for overall sample (N: 8) on ACPC-DD is 1024 (51.2%; SD: 142.87) out of maximum possible score of 2000 for any given child assessed on this tool (Table 1). This improved following behavioral intervention to 1110 (55.5%; SD: 147.55) by a clear margin of 86 points (4.3 %). Concurrently, out of maximum possible score of 200, there is decrement on pre-to-post intervention mean *Problem Behavior Intensity Scores* (PBIS) of 40.12 (20.06%; SD: 16.94) to 30.75 (15.38%; SD: 16.03) measuring decrease by 9.37 points (4.69%) for parents; 48.87 (24.44%; SD: 14.15) to 31.87 (15.94%; SD: 9.20) showing decrease by 17 points (8.5%) for teachers; and from 46.37 (23.16 %; SD: 12.73) to 30.87 (15.44%; SD: 8.82) with decrease by 15.5 points (7.72 %) for therapists respectively.

In terms of *Problem Behavior Frequency Score* (PBFS), based on presence or absence of given problem behaviors, out of maximum possible score of 100, there is decrement between pre-to-post intervention from 28.13 (SD: 8.71) to 25 (SD: 10.42) by 3.13 points (3.13%) for parents; 30.75 (SD: 7.70) to 26.75 (SD: 6.20) by 4 points (4%) for teachers; and from 29.5 (SD: 6.32) to 26 (SD: 5.73) by 3.5 points (3.5%) for therapists respectively. Thus, the trend of reported decrements for, both, PBIS and PBFS is highest in teachers, followed by therapists and least by parents of the children although none of the gains are statistically significant (p: >0.05)(Table 2). Table 2.

Concurrent Percentage Increment/Decrements for Skill & Problem Behavior Scores across Informants

	SB	PBIS-P	PBIS-T	PBIS-Th	PBFS-P	PBFS-T	PBFS-Th
BL	51.2	20.06	24.44	23.16	28.13	30.75	29.50
FL	55.5	15.38	15.94	15.44	25.00	26.75	26.0

(Note: Values as converted to common point of reference as percentage gain or loss);



(BL: Base Line; FL: Final; SB: Skill Behavior; PBFS/Th/T/P: Problem Behavior Frequency Score as given by Therapist/Teacher/Parent; PBIS/Th/T/P: Problem Behavior Intensity Score as given by Therapist/Teacher/Parent)

(b) Domain Wise Distribution of Pre to Post-treatment Scores on Skill Behaviour

Even though there was overt changes in skill behaviors as reflected by increased test scores in the studied sample of children following behavior interventions, the overall results did not throw up statistically significant gains ($p: >0.05$). There are also forward moving skill behavior scores in all the measured domains of ACPC-DD. A further and deeper probe undertaken across the eight skill behavior domains (Table 3) reveal statistically significant gains only in area of 'sensory' behaviors between pre-test (Mean: 206.8; SD: 5.3) to post treatment (Mean: 213.8; SD: 5.5) scores ($t: 2.59$; $df: 14$; $p: <0.02$). Probably, the program focus, content, and/or even the demand of behavior change agents were on sensory issues in the studied children with autism. In retrospect, when such a perusal of records was carried out, it appears that the caregivers are more concerned with such issues than even on concerns related to whether their child can even independently carry out dressing, bathing, toilet or such other self care activities. In a related study, it has been shown that sensory-motor efficacy of children with autism can be improved through tailor-made interventions (Baranek, 2002; Dawson & Watling, 2000).



Table 3

Domain Wise Distribution of Pre to Post-treatment Scores on Skill Behaviour

Domain→	Sensory		Gross Motor		Fine Motor		Communication		Play		Self-Help		Cognitive		Pre Academic	
	BL	FL	BL	FL	BL	FL	BL	FL	BL	FL	BL	FL	BL	FL	BL	FL
Total	1654	1512	1338	1418	1215	1271	913	986	650	735	1269	1386	380	444	773	927
Mean	206.8	213.8	167.3	177.3	151.9	158.9	114.1	123.3	81.3	91.9	158.6	173.3	47.5	55.5	96.6	115.9
SD	5.3	5.5	11.5	10.4	18.5	16.0	37.4	40.4	13.7	14.0	30.3	28.0	23.6	30.0	29.8	7.1
T-value; df	2.59; 14		0.24; 14		0.81; 14		0.47; 14		1.53; 14		1.01; 14		0.59; 14		1.78; 14	
p-value	0.02; S		0.81; ns		0.43; ns		0.64; ns		0.15; ns		0.33; ns		0.56; ns		0.10; ns	

(BL: Baseline; FL: Final)(Cronbachs Alpha: -0.30770439; Split-Half (odd-even) r: -0.078935;
Spearman Brown Prophecy: -0.17140028; KR20: 1.168543238)

Table 4A

Domain Wise Distribution of Pre to Post-treatment Intensity Scores on Problem Behaviour

Domain→ Name↓	V&D		TT		MO		SIB		Rep. B		OB		H		Reb. B.		ASB		F		Oth	
	BL	FL	BL	FL	BL	FL	BL	FL	BL	FL	BL	FL	BL	FL	BL	FL	BL	FL	BL	FL	BL	FL
Total	50	37	33	18	33	25	29	24	53	35	65	39	53	31	27	13	0	0	13	12	14	13
Mean	6.4	4.6	4.1	2.3	4.1	3.1	3.6	3	6.6	4.4	8.1	4.9	6.6	3.9	3.4	1.6	0	0	1.6	1.5	1.8	1.6
SD	3.5	2.3	1.6	1.0	2.4	2.1	2.8	2.9	2.6	2.2	2.7	1.7	0.9	0.6	1.4	1.2	0	0	1.8	1.8	2.2	2.0
t-value	1.22; 14		2.70; 14		0.95; 14		0.421; 14		1.83; 14		2.84; 14		7.06; 14		2.76; 14				0.111; 14		0.162; 14	
P	0.24; ns		0.01; s		0.36; ns		0.68; ns		0.09; ns		0.01; ns		0.001; s		0.01; s				0.91; ns		0.874; ns	

(c) Domain Wise Distribution of Pre to Post-treatment Scores on Problem Behaviour

As with scores on overall skill behavior changes, the same trend is seen even with regard to improvements in their problem behaviors without statistically significant ($p > 0.05$). The PBSS covers ten sub-categories of behavior problems. This gives an opportunity for undertaking a concurrent domain analysis on intensity and frequency of problem behaviors in this sample of children with autism across two dimensions, viz., Problem Behavior Intensity Score (PBIS) and the Problem Behavior Frequency Score (PBFS).

While there are no statistically significant differences elicited from this sample with respect to Problem Behavior Frequency Score (PBFS) (Table 4B), such differences emerge only with respect to certain domains only in relation to Problem Behavior Intensity Score (PBIS)(Table 4A) as in case of 'temper tantrums' (BL Mean: 4.1; BL SD: 1.6; FL Mean:2.3; FL SD:1.0), 'hyperactivity' (BL Mean: 6.6; BL SD: 0.9; FL Mean:3.9; FL SD:0.6) and 'rebellious behavior' (BL Mean: 3.4; BL SD: 1.4; FL Mean:1.6; FL SD:1.2, $p < .01$). The score gains are insignificant for all the other problem behavior domains. Interestingly, 'anti-social behaviors' are not reported at all in children with autism. This implies that the behavioral intervention program has been probably successful only to the extent of reducing the intensity (not so much the frequency) of the problem behaviors in this sample of children with autism.



Table 4B

Domain Wise Distribution of Pre to Post-treatment Frequency Scores on Problem Behaviour

Domain→ Name↓	V&D		TT		MO		SIB		Rep. B		OB		H		Reb. B.		ASB		F		Oth	
	BL	FL	BL	FL	BL	FL	BL	FL	BL	FL	BL	FL	BL	FL	BL	FL	BL	FL	BL	FL	BL	FL
Total	39	34	20	17	24	20	19	18	30	26	37	34	31	30	17	11	0	0	11	10	8	8
Mean	4.9	4.3	2.5	2.1	3	2.5	2.4	2.3	3.8	3.3	4.6	4.3	3.9	3.8	2.1	1.4	0	0	1.4	1.3	1	1
SD	2.5	2.0	0.9	0.8	1.4	1.5	1.8	1.8	1.2	1.5	1.6	1.5	0.4	0.5	0.8	1.1	0	0	1.3	1.3	1.2	1.2
T-value; df	0.53; 14		0.94; 14		0.69; 14		0.11; 14		0.74; 14		0.39; 14		0.44; 14		1.46; 14				0.15; 14		0.00; 14	
p-value	0.60; ns		0.36; ns		0.50; ns		0.91; ns		0.47; ns		0.71; ns		0.67; ns		0.17; ns				0.88; ns		1.00; ns	

(BL: Baseline; FL: Final)(V&D: Violent Destructive Behavior; TT: Temper Tantrums; MO: Misbehavior with Others; SIB: Self Injurious Behavior; Rep. B.: Repetitive Behavior; OB: Odd Behavior; H: Hyperactivity; Reb. B.: Rebellious Behavior; ASB: Anti-Social Behavior; F: Fears; Oth. Others)



(d) Reliability & Validity

Inter observer reliability between teachers, parents and therapists involved in planning, implementation and reporting of gains accrued with behavioral intervention against its baseline was undertaken by calculating Pearson's Correlation Coefficients and drawing the matrix between ratings given by the three independent mutually blind respondents. The inter-rater reliability coefficients for overall ratings on skill and problem behaviors are found to be in upper range of $r: 0.85$ to $r: 1.00$ ($p: <0.001$). Cronbachs alpha-internal consistency coefficients of reliability is measured as 0.73, split half (odd-even) reliability is 0.81, Spearman-Brown Prophecy is 0.89 and KR20 is 0.82 respectively. Similarly, for domain wise distribution of pre to post-treatment scores on skill behaviour, Cronbachs alpha coefficients of reliability is found to be -0.31, Split-Half (odd-even) $r: -0.08$, Spearman Brown Prophecy is -0.17 and KR20 is 0.69. The negative signs are indicating that the mean of all inter-item correlations is negative. Is this a reflection of measurement error? Or is it suggestive that the sample size is too small? Or is it a probable indication that the respondents have underplayed all skill behavior areas except 'sensory' domain, which is characteristically read and/or more frequently attributed for children with autism? Similarly, with regard to problem behavior intensity and frequency, while correlation coefficients of the three raters (parents, teachers and therapists) cluster consistently above or higher than $r: 0.90$ for baseline to final evaluation; for skill behaviors, they are low ($r: <0.35$) before and after treatment. Are these indications that greater the skill behavior scores of children, lower are the probabilities of their having problem behavior scores in terms of intensity as well as frequency? While no definite conclusions may be drawn until more research is undertaken exclusively along these lines, the indications, if any, appear to be so. Although not in the ambit of this investigation, another post-interventional terminal evaluation reflected significant quantitative and qualitative gains which were also maintained after a 4-week follow thereby testifying the value of customised behavioural techniques in skill enhancement and problem behaviour reduction simultaneously.

In sum, the results of this study has demonstrated the feasibility for identifying, listing and recording a baseline on the different types and specific instances of problem behaviors as distinct from deficits in their skill behaviors in children diagnosed as autism. It has shown that it is possible to evolve or carry out case-by-case topological mapping of situations, triggers, antecedents, functions, maintaining aspects and consequences of the identified or observed problem behaviors for the identified children autism before undertaking strategic individualized and/or small group based behavioral interventions within specified time frame and/or across envisaged sessions in home or school settings. The results indicate increments in post intervention scores measuring skill behavior acquisition and concurrent decrease in scores measuring problem behaviors as reported independently by parents, teachers as well as therapists following individualized and/or small group based behavioral interventions on the targeted children with autism for a specified time frame and/or across envisaged sessions in home or school settings. Further, related reliability and validity indices of the measured variables are also calculated and found to be high. However, admittedly, there may be issues related to treatment fidelity in home-based interventions, compliance, difficulties in accurately measuring the extent of interventional inputs especially in naturalistic and parent-based interventions and the need for their independent monitoring that may all require more in-depth and systematic explorations in near future.

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