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RESEARCH PAPER

Effectiveness of a Function-Based ABA Intervention for Tantrum Reduction in a Preschool Child: A Single-Subject Design Study

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ABSTRACT

This study aimed to explore the effectiveness of a function-based Applied Behavior Analysis (ABA) intervention using Differential Reinforcement of Alternate Behavior (DRA) and Extinction to reduce the temper tantrums in a preschool-aged child living in a Pakistani joint family. Temper tantrums in pre-school years, if left unaddressed, lead to behavioral problems in later life (Hoyniak et al., 2022). It was hypothesized: The intervention would significantly reduce tantrum's mean rate compared to baseline and tantrum behavior would be replaced with functionally equivalent adaptive behaviors. A single-subject A-B-A withdrawal design was employed for at 30 days intervention guided by Functional Behavioral Assessment (FBA). Quantitative frequency recordings were conducted during baseline, intervention, and follow up phases. The results showed significant reduction in temper tantrums frequency with results being maintained in the follow ups. Future studies should utilize the intervention on larger population and incorporate caregiver fidelity checks to generilze and maintain the integrity of the intervention.

Keywords: Applied Behavior Analysis (ABA), Differential Reinforcement of Alternative Behavior (DRA), Tantrum behavior, Extinction, Functional Behavioral Assessment (FBA)

Introduction

Temper tantrums are among the most frequently reported behavioral challenges in early childhood. Nearly all caregivers observe at least one tantrum in children aged one to six. These episodes often involve crying, screaming, aggression, or dropping to the floor, typically triggered by frustration, limited communication abilities, or disruptions in routine (Wilder & Hodges, 2020). While tantrums are developmentally typical, persistent, prolonged, or aggressive episodes may signal underlying concerns (VanDenAkker et al., 2022). For instance, tantrums lasting over 15 minutes or occurring more than three times per week have been linked to elevated caregiver stress and later emotional or behavioral difficulties (Hoyniak et al., 2022).

Given these risks, early identification and timely intervention are critical. Early childhood represents a unique period of neuroplasticity and behavioral flexibility, making it an ideal window for promoting healthy emotional and behavioral development (Dehorter & Del-Pino, 2020). In a pool of evidenced based interventions, Applied Behaviors Analysis (ABA) has shown a promising framework in reducing maladaptive behaviors in children (Ho et al., 2020; Rodgers et al., 2021). The intervention of the present research uses Functional Behavioral Asessment (FBA) to identify the underlying function of the problem behavior. Followed by this, Differential Reinforcement of Alternate Behavior (DRA) and Extinction are used to reduce the temper tantrums in the participant.

This study is grounded in functional-contextual approach, emphasizing the purpose of behavior in its environment and teaching socially appropriate alternatives. It aligns with

the principles of Positive Behavioral Support (PBS), which prioritizes reinforcement, skill-building, and environmental adjustment over punitive methods (PBS, 2025). Such approaches foster ethical, sustainable change that preserves the dignity of the child (Rios et al., 2023).

Despite the growing evidence base for ABA, most research is concentrated in Western contexts. Its application in non-Western, naturalistic settings—such as Pakistani joint families—remains underexplored (Pervin et al., 2022; Sharma & Rangarajan, 2019). In joint families, there are multiple caregivers with different belief systems that makes it hard to implement procedures consistently (Bacotti et al., 2022). Research papers wise, a lack of experimental case studies employing ABA strategies by caregivers in joint family systems was observed (VanNoorden et al., 2024)

Filling this gap is crucial for making interventions that are culturally appropriate and can be easily applied in realistic settings. Scalable mental health support systems and inclusive care settings can be taught these function based strategies after studying them. As said by Luby et al., (2021), children are very responsive in environmental signals hence, early intervention is important before their problem behaviors become fixed. As proven, early interventions have been shown to lower the risk of long term emotional and behavioral problems (Kurtz et al., 2020).

This research explores the impact of using function-based ABA interventions in reducing temper tantrums in a preschool child living in a Pakistani joint family. It contributes to the literature by demonstrating the practicality and cultural relevance of caregiver-implemented strategies in home settings and highlighting how similar behaviors (e.g., tantrums) can serve different functions.

Literature Review

ABA is based on the principals of operant conditioning where reinforcement or punishment received from the environment influences a person's behavior (Hu, 2024). One of the main components of ABA is Functional Behavioral Assessment (FBA) which identifies which antecedents and consequences are playing a role in maintain a behavior (Cooper et al., 2020). It usually utilizes procedures like interviews and observations to analyze if the behavior is being maintained by reinforcements such as escape, attention, access to tangible items or any other reinforcement (Fahmie & Luczynski, 2020; Zhang, 2024). Researchers say that when FBA is used in interventions, it enhances its effectiveness and individuality and now FBA is being used in telehealth services which had made it highly accessible to people (Neely et al., 2021; Schieltz et al., 2022; Davis et al., 2022).

When the function is identified, Differential Reinforcement of Alternative Behavior (DRA) may be used to modify the problem behavior. In DRA, only the alternate and desired behavior is reinforced in place of the maladaptive behavior. It is essential that the replacement behaviors meets the same function as the problem behavior (Cooper et al., 2020; Vollmer et al., 2020). DRA has been utilized in various places to work in tantrums and other problematic behaviors (Jessel & Saini, 2023; Larasyifa & Iswari, 2023). Often times DRA is combined with extinction procedures to make it more effective (Brown et al., 2020). Although extinction is typically effective, it can initially cause a temporary increase in problem behavior, known as an extinction burst (Muething et al., 2024). To address this problem, the researchers have recommended using thinning reinforcement schedules and applying multiple scheduling techniques (Iannaccone & Jessel, 2023) during DRA-extinction interventions). Some researchers also also elaborated that instead of extinction, if DRA is alone applied rigorously and the caregiver is trained in it appropriately too, it can improve its effectiveness as evidenced by Adedipe and Walton's research (2025) demonstrating the effectiveness of caregiver-delivered DRA paired with caregiver training and telehealth coaching in low-income settings.

Hypotheses

The study's objectives are to identify the behavioral functions of tantrum behavior and assess the intervention's impact on reducing maladaptive behaviors and promoting adaptive alternatives. Based on this, the following hypotheses were proposed:

H1: The intervention will significantly reduce tantrum's mean rate compared to baseline.

H2: The child's tantrum behavior will be replaced with functionally equivalent adaptive behaviors, such as appropriately requesting attention or access to preferred items.

Material and Methods

Experimental Design

This was a 30 consecutive day intervention. A single-subject A-B-A design was employed, consisting of three phases: baseline (A), intervention (B), and return to baseline conditions (A).

Participant

The participant was a 3-year, 11-month-old Pakistani girl (XY) living in a joint family system comprising her parents, two older siblings, and extended relatives including grandparents, uncles, aunts, and cousins. As the youngest of three children, she had a sister in second grade and a brother in first grade. Her father worked as a businessman, and her mother was a homemaker.

Although not yet enrolled in formal schooling, the participant demonstrated age-appropriate academic readiness, showing familiarity with colors, shapes, counting, and the alphabet—skills taught informally by her parents. She was born via cesarean section with no complications during pregnancy, birth, or development, and had no reported medical or developmental concerns. Her parents described her as a bright and expressive child who enjoyed cooperative play with siblings and cousins, and had particular interests in drawing and playing with makeup.

She was referred for intervention due to a noticeable increase in tantrum behavior, particularly when her demands were not immediately fulfilled. According to her parents, this behavior intensified during Ramadan, when family members were more likely to comply with her requests to avoid disruption during iftar (the evening meal). The target behavior—tantrum throwing—was operationally defined as "crying very loudly and forcefully, to the point that her face turned red, while lying on the floor and flapping her hands and legs." Crying episodes related to sibling disputes or other situations that did not meet this specific topography were excluded from data collection.

Frequency Recording Method

Frequency recording was used to document each occurrence of the target behavior during structured observation periods and follow ups. A frequency count was recorded each time the participant engaged in behavior meeting the operational definition during the designated observation time of 1 hour.

Functional Behavioral Assessment (FBA)

Conducted during the baseline phase, the FBA used covert observation and ABC data collection to identify maintaining factors. Common antecedents included being denied access to preferred activities; consequences typically involved compliance or attention—

particularly from the mother or grandfather suggesting a primary function of access to tangibles and a secondary function of attention.

Procedure

The study was conducted in the participant's home over a period of 30 consecutive days using a single-subject A-B-A withdrawal design. The phases included a 5-day baseline (A1), a 20-day intervention phase (B), and a 5-day post-intervention observation (A2), with one-hour sessions conducted each day. The home environment provided a naturalistic context with a variety of stimuli, reinforcement sources, and caregivers, allowing for both structured intervention and ecological validity.

Baseline Phase

During the initial five days, the experimenter remained a passive observer, recording the frequency of tantrum episodes without introducing any interventions. ABC documentation helped identify the function of the behavior. Input from the parents supported data accuracy. Patterns indicated that tantrums were primarily maintained by positive reinforcement—namely, access to preferred items or activities—and secondarily by attention from family members. Based on this assessment, a replacement behavior of polite verbal requests was selected, and a DRA-based intervention was developed.

Intervention Phase

During the 20-day intervention phase, the environment was structured to elicit mild frustration or denial (e.g., placing desired items out of reach) to replicate antecedents identified in the FBA. When the participant began to escalate behaviorally, she was prompted and modeled to use polite verbal requests. If she complied, reinforcement was provided both through access to the desired item (when appropriate) and through social rewards such as praise, star drawings on her hand, and verbal approval in front of family members. Tantrum behavior received no reinforcement, in accordance with extinction procedures.

To support generalization and consistency, informal training sessions were conducted with family members. They were educated on the reinforcement principles, coached on when and how to reinforce the alternative behavior, and instructed to ignore tantrums. Caregiver involvement was consistent, enhancing the intervention's integration into daily family routines. To promote learning and gradual independence, the reinforcement schedule was progressively faded.

Table 1
Reinforcement Schedule

Days	Schedule Type	Description
6–10	Continuous Reinforcement (CRF)	Reinforcement delivered for every appropriate request
11–15	Fixed Ratio 2 (FR2)	Reinforcement delivered after every second request
16–20	Variable Ratio 3 (VR3)	Reinforcement delivered on average every third request
21–25	Naturalistic Intermittent	Reinforcement delivered only in natural social contexts

In parallel, extinction procedures were applied consistently. For example, when the participant made an unreasonable demand—such as wanting to accompany her father on every outing—and it was not feasible, no attention or access was granted following a tantrum. Parents were coached to implement extinction carefully, including preparing the environment to manage potential extinction bursts.

Post-Intervention Phase

In the final five days, the experimenter resumed a passive observation role. No active reinforcement or extinction procedures were applied. This phase assessed the sustainability

of behavior change without direct intervention. Data collection followed the same operational definitions and methods used during the baseline.

Follow Ups

Following the A-B-A phases, three follow up assessments were conducted at 2 weeks, 1 month, and 3 months post-intervention. During each follow-up, the target behavior was observed for one hour under naturalistic conditions without reinforcement or extinction procedures to evaluate the maintenance of gains.

Data Analysis

Behavioral data were converted to frequency per hour to standardize analysis. Mean tantrum rates were calculated for each phase and follow ups. Visual inspection techniques were used to evaluate intervention effects, focusing on changes in level, trend, variability, and the overall magnitude of behavior reduction across phases.

Ethical Considerations

All procedures were supervised, and regular updates were shared with a supervising professional. Informed parental consent was obtained prior to the study. The focus on promoting functional communication and reducing problematic behavior aligned with ethical and socially valid treatment goals. Conducting the intervention in the home setting supported ecological validity and minimized disruptions to family life. As only one experimenter conducted observations and implemented procedures, interobserver agreement was not used.

Results and Discussion

Table 2
Tantrum Frequency in Baseline Phase

Day	Tantrums Observed
1	6
2	5
3	6
4	7
5	5
Total	**29**
Mean Rate (A1):	**5.8 tantrums per hour**

Throughout the 5-day baseline phase, the participant exhibited consistently high rates of tantrum behavior, averaging 5.8 episodes per hour, with minimal variability and no indication of a decreasing trend, suggesting the behavior was firmly established.

Table 2
Tantrum Frequency in Intervention Phase

Day	Tantrums Observed
6	7
7	8
8	8
9	6
10	5
11	4
12	4
13	3
14	2
15	2
16	2
17	1
18	2

19	0
20	1
21	0
22	1
23	1
24	0
25	1
Total	**58**
Mean Rate (B)	**2.9 tantrums per hour**

The intervention phase resulted in a marked decrease in tantrum behavior, with the average rate dropping to 2.9 per hour—nearly half of the baseline level. An expected extinction burst occurred on Days 7 and 8, marked by a brief spike in tantrums following the withdrawal of reinforcement. This was followed by a consistent decline as the reinforcement schedule was gradually thinned from continuous to naturalistic delivery. By the final sessions, tantrum frequency had reduced to zero or one per hour, highlighting both the success of the intervention and the development of functional alternative behavior

Table 3
Tantrum Frequency of Post-Intervention Phase

Day	Tantrums Observed
26	2
27	1
28	1
29	1
30	1
Total	**6**
Mean Rate (A2)	**1.2 tantrums per hour**

During the post-intervention phase, tantrum behavior remained low and stable, averaging 1.2 episodes per hour. Without any continued use of reinforcement or extinction procedures, the participant sustained appropriate behavior, suggesting that treatment effects generalized and persisted independently. This stability highlights successful skill acquisition and supports the intervention's social validity within the child's natural environment.

Table 4
Tantrum Frequency During Follow ups

Follow Up (1 hour)	Tantrums Observed	Mean Rate
F1 (2 weeks)	1	1
F2 (1 month)	0	0
F3 (3 months)	1	1

Note: F1= 1st Follow up, F2= 2nd Follow up, and F3= 3rd Follow up,

At 2 weeks post-intervention, the tantrum frequency was 1 per hour; at 1 month, 0 per hour; and at 3 months, 1 per hour. These results indicate that the participant maintained appropriate behavior over time, with minimal re-emergence of tantrums.

Discussion

This study evaluated the effectiveness of a function-based Applied Behavior Analysis (ABA) intervention, combining Differential Reinforcement of Alternative Behavior (DRA) and extinction, to reduce tantrum behavior in a preschool-aged child living within a Pakistani joint family system. The intervention yielded a significant reduction in tantrum frequency—from 5.8 tantrums per hour during baseline to 2.9 in the intervention phase and 1.2 in the post-intervention phase—supporting both study hypotheses and contributing to existing literature on culturally relevant behavioral interventions.

The findings are supported by previous researches that demonstrated problem behaviors of children being effectively managed using function based interventions (Adedipe & Walton, 2025; Jessel & Saini, 2023). In the present research the reduced frequency of temper tantrums were also observed in the follow ups conducted after the cessation of intervention. This suggested that the intervention used was generalized appropriately in naturalistic settings and sustained its effects in that environment even though the therapist was not present and the reinforcement had been stopped. The child only learned a preplacement adaptive behavior but was also able to generalize the response in various settings. This again highlights the importance of parental given interventions in effectively influencing the child's behavior.

An expected extinction outburst occurred on 7th and 8th day of the intervention. The frequency of the tantrums increased because the child's previous responses were being challenged and were no longer being reinforced. However, the frequency of the problem behavior gradually decreased suggesting that the child adapted to new behaviors and the spike was only temporary (Lambert et al., 2024).

Another important thing done in this intervention was the FBA which identified the function of the child's behavior to be access to tangible items and attention seeking. DRA applied in this intervention taught a replacement behavior (asking for things politely) that served the same function as the problem behavior highlighting the importance of finding replacement behaviors that are compatible with the function identified with problem behavior (Cooper et al., 2020; Vollmer et al., 2020). The experimenter's observations and caregiver input in FBA resulted in an accurate hypothesis for the behavior even if a full functional analysis was not conducted due to time and resource constraints. This highlights that FBA's can be effective is low resource settings as well (Hanley et al., 2020; Call et al., 2024).

Similarly, the consistent behavior change observed through out and then again assessed in follow ups proved that the intervention was administered appropriately and successfully even though treatment fidelity was not assessed formally. This signifies that interventions are highly effective in home settings when care givers are actively involved in the process as well (Melanson et al., 2023)

Another interesting reason for the intervention's success could be how easy it was for the child to do the replacement behavior instead of engaging in the problem behavior of a tantrum. As per behavioral economic principles, a person is likely to engage in a behavior that is easier for them and will get them results (Cooper et al., 2020) which, in this intervention happened. Moreover, during the intervention, effort was made to reinforce alternative behavior while giving less attention to tantrums. This balanced approach to DRA was opted rather than completely ignoring the problem behavior and only recognizing alternative behavior (Vollmer et al., 2020). Additionally, thinning reinforcement schedules reduced the dependency of the child on external rewards and aided in maintenance of the results which is supported by DRA's successful practices (Trump et al., 2019).

The participant being under 4 years old and successfully changing her behavior solidifies the fact that children in this age are rapidly developing cognitively and behaviorally. Due to their malleable nature their behaviors can be shaped easily (Hoyniak et al., 2022; Luby et al., 2021; Kurtz et al., 2020).

Most importantly, the research shows that ABA strategies can be adapted in collectivistic cultures as well. The joint family system posed unique challenges like multiple caregiver roles and multigenerational influences on the child. The problems were addressed through communicating with caregivers. This contributed to the literature that ABA can be applied in different cultures (Johnson et al., 2021; Sharma & Rangarajan, 2019; Steinbrenner et al., 2022).

Conclusion

The present research proved the effectiveness of a function based ABA intervention using DRA and extinction procedure to reduce tantrum behavior of a 3 year old. The behavior was successfully transformed and maintained without reinforcements serving as an evidence that these interventions are effective and can produce sustainable results in the long term.

Implications

The findings of the study have important implications in clinical settings and in the development of family focused interventions. The study showed that caregivers, with support, can administer the intervention and enhance its effectivity. Secondly, the fading of reinforcement showed that these behaviors can be maintained in the long term as well without reinforcements. Clinicians can note this to aid in long term results. Lastly, the study highlighted the importance od using functional analysis to plan an intervention can make it highly effective. Understanding why a behavior occurs made it possible to replace tantrums with more appropriate alternatives, reinforcing the importance of individualized, function-based strategies, particularly when working with families from diverse cultural backgrounds.

Recommendations

As single-case study, the findings can't be generalized to all children with tantrum behaviors. The study would have been strengthened by gathering formal feedback from the caregiver, such as satisfaction ratings or perceptions of usefulness. In addition, checking for caregiver fidelity—how closely the procedures were followed—would offer more insight into what contributed to the treatment's success. Although the follow up data suggest promising maintenance, future studies should use standardized caregiver checklists and direct comparisons across settings to validate long-term outcomes further.

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