

THERAPEUTIC INTERVENTIONS FOR SCREEN-INDUCED SOCIAL COMMUNICATION DELAYS IN PAKISTAN

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Abstract

Excessive early screen exposure has been increasingly associated with social communication delays in toddlers. There is emerging evidence which supports a clinically distinct yet potentially reversible presentation termed virtual autism. Though there is a work on screen-dominant toddler in clinical environments, yet practitioner-level evidence regarding therapeutic management of this population is not as much. Therefore, this study has been conducted with eight purposively sampled clinicians who are practising in Lahore, Islamabad, Karachi, and Multan. Participants represented diverse professional backgrounds including behavioural therapy, occupational therapy, speech-language pathology, and special education. Data were collected through semi-structured responses and subjected to inductive thematic analysis using qualitative research methodology. In results, eight themes are identified, which includes screen removal as a reversibility-based diagnostic indicator, a recognisable behavioural signature of screen dependence, displacement of native-language interaction, naturalistic re-engagement strategies, parent-mediated home interventions incorporating culturally adaptive tools, the joint family structure sometimes as a barrier to therapeutic consistency, social referencing as the primary recovery marker, and screen dependence as a caregiver-perpetuated phenomenon. In this study, clinicians has demonstrated implicit alignment with Naturalistic Developmental Behavioural Intervention principles, adapted to local sociocultural contexts without formal theoretical grounding. Effective intervention necessitates whole-family approaches. Findings of this study underscore on the need for a culturally validated assessment tools, structured screen-reduction protocols, and context-specific clinical guidelines within the developmental healthcare framework of Pakistan.

INTRODUCTION BACKGROUND AND CONTEXT

In the twenty-first century, the screen has become the most pervasive caregiver substitute in the world. Before a child speaks their first word, before they learn to walk, and often before they are a year old, they are handed over a smartphone or seated before a television. This is done not out of neglect, but out of habit, economic pressure, and sometime due to a cultural home-based environment that has normalized digital involvement as a feature of modern-day parenting. Yet the developmental cost of this normalization is increasing day by day and it is difficult to ignore. A landmark cohort study has found that children who were exposed to four or more hours of screen time per day at one year of age, they were nearly five times more likely to exhibit communication delays by the age two in comparison with children with less than one hour of daily exposure (Takahashi et al., 2023a). As clinicians around the world are reporting a rise in toddlers presenting with autism-like social communication deficits whose symptom in the beginning correlates almost entirely with maximum time screen exposure; therefore, a fundamental question has emerged at the connection of studies regarding developmental pediatrics, speech-language pathology, and clinical psychology: What do we do about it?

Social communication, which is the capacity to use language, gesture, eye contact, joint attention in human connections, is nowadays amongst the most time-sensitive achievements of early childhood. It develops through reciprocal face-to-face interaction between a child and their caregivers and their environment. When screens displace this interaction, the developmental cost is measurable. In this context, scholars through crosssectional and longitudinal studies have consistently demonstrated that the excessive screen exposure in toddlers is associated with their reduction in their eye contact, it diminishes their joint attention, impairs symbolic play, and causes delays in both receptive and expressive language

(Dubisetty et al., 2025; Flynn & Datta, 2025). Varadarajan et al., (2021) in their study have found that the prevalence of excessive screen time among children under five to be 71%, with language and communication delays directly associated with the increase in exposure time. Likewise, Al Hosani et al., (2023) in their study have found in UAE-based case-control that 90.3% of children who presents with speech and language developmental delay were electronic device users (Harlé, 2019).

Furthermore, researchers have now started to documenting a clinical phenomenon which is called 'virtual autism' which has a set of autismlike features (social withdrawal, language delay, repetitive-screen-fixated behaviour, poor joint attention) observed in children who are exposed to excessive early screen time (4 or more hours per day) but reversed upon restricting screen time and starting structured therapeutic treatments (Detroja & Bhatia, 2024; Nagel & Sharman, 2025; Sharma et al., 2025). A prospective study conducted in Islamabad, Pakistan (Nasir et al., 2023) found that kids who were diagnosed with this profile who took speech and behaviour therapy and also practiced strict screen reduction displayed an amazing recovery: within 10 months or one year of intervention, 80% of kids enrolled in the study no longer displayed behaviours involving autism on the Autism Diagnostic Observation Schedule. A parallel quasi-experimental study conducted at a Pakistani military hospital (Rashid et al., 2025b) also noticed that reduced screen time to less than 30 minutes/day for 3 months and found a statistically significant improvement in vocabulary in children with specific speech delay who participated in the study when compared to controls who continued their normal screen usage. Despite this growing body of evidence on the association between screen exposure and social communication delay, and the initial promising evidence on the reversibility of these symptoms as a result of intervention, there are still gaps in the literature. Firstly, there has been a lack of qualitative studies that have looked at how

clinicians, such as speech-language pathologists, developmental paediatricians, occupational therapists, and behaviour analysts actually engage in the therapeutic process with screen-dominant toddlers in their real-world clinical practice. Current literature has focused on quantitative studies, using standardised instruments to measure outcomes, and has not examined the practitioner's experiences, clinical reasoning or adaptations to the clinical frameworks of existing interventions. Secondly, the field is devoid of any area-specific data from Pakistan, where the sociocultural, infrastructural and family-dynamics specific to the area influence the presentation of a screen-induced delay, as well as the ability for therapeutic responses. Third, although the impact of screen time on therapy outcomes has been demonstrated to be significant: children with who had greater than one hour of daily screen time during intervention periods had shown poorer therapeutic gains when compared with children who had less screen time (NagaSrivani et al., 2020), however, treatment strategies for using screens as a concurrent variable in therapies are under-documented. These spaces, when taken together, form an under-theorised field: clinical practice around the intervention with screen-dominant toddlers in low-to-middle income environments, such as in the Pakistan.

Moreover, though therapeutic intervention for these delays in social communication among the Pakistani toddlers can be likened to the application of an established protocol, this study makes it clear that it is also a complex, adaptive, and context-specific process, which is influenced by the tacit knowledge of the practitioners involved, negotiation among the family systems, and the uneven exposure to knowledge about the risks associated with screen exposure in the healthcare environment. It is critical to the process of developing locally relevant and evidence-informed clinical guidance to understand this process.

In this context, this study is being conducted with specific to toddlers (18 months to 5 years) who

have social communication delays where clinicians have attributed excessive screen time as a significant primary factor and or as a contributing factor. It investigates the attitudes and practices of professionals in their clinical environments in Pakistan such as Speech language therapists, Psychologists, Occupational therapists, Developmental paediatricians, and Behaviour analysts. The study does not attempt to resolve the issue of whether the delay in development is caused by screen or whether it is a disorder without a known cause Autism Spectrum Disorder, and it does not attempt to do a quantitative testing of cause-and-effect. It does not explore the parents/carer viewpoint as the primary data (although this might be visible in the clinician accounts) and does not consider the effectiveness of any one intervention protocol through controlled measurement. The scope of this study is intentionally limited to the experience of practitioner and their clinical reasoning.

This study is both practical and theoretical in nature. The triple jeopardy of Pakistan is that the number of smart phones is increasing, joint families are shrinking, and there is a rising trend of toddlers presenting with communication profiles that clinicians find difficult to differentiate – or difficult to separate from – classical ASD (Nasir et al., 2023). A study in Islamabad revealed that there was a high correlation between the severity of screen time and level of speech delay in children already undergoing speech therapy ($\chi^2 = 69.073$, $p < 0.001$) (M. Ali et al., 2025). Practitioners have to improvise without support from any clinical context-specific guidelines, and many of the frameworks they are using were created in very different sociocultural settings. The identification and codification of practitioners' approaches in this study can contribute to the training programs, clinical guidelines, and public health campaigns in Pakistan. This research is theoretically part of a growing body of literature, which seeks to break down the dichotomy of autistic and typical development by uncovering a presentation shaped

by the environment that is clinically distinct and has significant implications for diagnostic practice, therapeutic planning, and understanding the impact of the environment on early neurodevelopment.

Research Methodology & Scheme of the study

This study has adopted a qualitative research design, which is based on an interpretivist epistemological framework. Data was collected through indepth, semi-structured interviews obtained through google forms with clinicians who are practising in the field of autism and developmental delays in Pakistan. Participants have been selected through purposive and snowball sampling methods with an aim to include all types of professionals who are having a direct clinical experience and who are managing screen-dominant toddlers. Thematic analysis is made in order to identify, organise, and interpret patterns found in participant accounts. This approach is considered appropriate with the aim of this study, to seek not statistical generalisation but to be conceptually rich, to get an understanding about how clinicians think, decide, and act in complex, real-world therapeutic encounters.

This study attempts to answer this specific research question: What clinical strategies do practitioners who are working in the field of autism and developmental delays in Pakistan are using to mitigate social communication delays in toddlers who shows screen-dominant behavioural profiles, and how do they conceptualise, adapt, and evaluate these strategies within the limitations of the local, clinical, and sociocultural context?

The structure of this paper is as follows. Section 2 of this study covers the literature review, regarding the developmental impact of early screen exposure and about the emerging concept of virtual or screen-induced autism. It also covers the existing therapeutic frameworks on the social communication delay briefly. Section 3 this paper covers the findings which are organised around

the key themes that have emerged from the analysis of clinician accounts. Section 4 is the discussion portion on the findings. It also explores their implications for clinical practice and policy. The paper concludes in its Section 5 with having a summary of findings, acknowledgement of limitations, and directions for future research.

Literature Review

Overview

This literature review draws on three related areas of scholarship, which are interdependent and together contribute to the intellectual frame for the current study. The first relates to how early screen exposure negatively affects social communication in toddlers' neurological and developmental processes. The second highlights the new clinical concept of 'virtual autism' or 'screen-induced autism' that is especially pertinent to the present research. The third explores the current evidence and utility of therapeutic frameworks currently used to treat social communication delay, how they are flexible and can be applied to low resource, non-Western contexts like Pakistan. These three strands together demonstrate a very substantial and practically significant knowledge gap between the problem and clinical management of the problem in the context of Pakistan. The effect of early screen exposure on social communication is discussed. Early exposure to screens and developmental impacts on social communication is discussed.

The Developmental Impact of Early Screen Exposure on Social Communication

The Critical Period and Mechanisms of Harm

Early childhood, particularly when the period is between birth and five years of age, opens the window for the development of social communication. During this period, the brain undergoes several structural growths. The neural circuits behind the language learning, attention making, emotional reciprocity, and social cognition are deeply sensitive to their

environmental inputs which they receive. Social communication is not programmed, but built—or bargained for—over an extended series of thousands of contingencies among the child and caregivers, contingent and responsive, face-to-face exchanges. Screens provide a basic non-contingent type of stimulation. Screens, by their nature, provide non-contingent stimulation — stimulation that is not responsive to the child, does not follow the child's gaze, does not respond to the child's communication attempts. This separation is not an insignificant one. Advanced speech recognition research of the home language environments of 220 families revealed that higher screen time was correlated with lower adult words, child vocalisations and conversational turns, most notably at 36 months (Brushe et al., 2024). This 'technofence' phenomenon — the removal of the complex interrelational scaffolding about which language is structured — has been created with various study settings and participant groups.

Evidence is now emerging from longitudinal studies of the displacement hypothesis, which suggests that screen time is a constraint on time available for enriching developmental activities. A large NZ cohort study of 6,281 children identified that being exposed to more than 1.5 hours of screen time per day at two years of age was independently linked to lower levels of language ability and higher levels of peer relationship problems when the children were 4.5 years old (Gath et al., 2025). Researchers who conducted a systematic review and meta-analysis that combined the findings of 28 eligible studies have found that screen time was negatively correlated with the early language development whereas co-viewing with the caregiver and delaying screen exposure were protective factors (Xie et al., 2024). Importantly, the timing of first exposure also seems to be important, at least as much as how long exposure occurs: A comparative cross-sectional study of Egyptian children showed that those who were first exposed to screens before 24 months had significantly higher rates of language delay (55%) and weaker phonological memory and executive

function than those who were first exposed after that point (L. M. H. Ali et al., 2025).

Emerging neuroimaging evidence in this context provides biological plausibility for these associations. Scholars who performed a structural equation modelling analysis of MRI brain data from 70 toddlers concluded that there was a negative association between screen time at age 2 and volume of the pars triangularis, a brain region which is involved in language development, and that decreased volume at age 2 was associated with decreased language outcomes and increased screen reliance at age 3. This could create a vicious cycle of early screen exposure that creates neural substrates that inhibit language development, leading to increased screen-seeking behaviors (Choi et al., 2025). This discovery has important implications for potential therapeutic intervention, which has not yet been fully explored.

Social Communication as the Primary Domain of Vulnerability

Social communication consistently is the developmental domain most specifically and persistently affected in the literature by negative screen-related associations in multiple developmental domains, including gross motor skills, executive function, sleep, and attention. In a large Japanese cohort study of 7,097 mother-child pairs, it was communication that demonstrated the strongest, most persistent links with screen exposure, with higher odds of delay holding true from ages two to four (Takahashi et al., 2023b). This is by no accident a domain-specificity. Live, dyadic, contingent human interaction is unique in its role in supporting social communication, which is the kind of interaction that is most directly replaced by screen exposure.

In a cross-sectional study in India, children aged between 18-36 months who saw screens for more than 2 hours per day showed significantly less eye contact, joint attention and symbolic play than those with less exposure (Dubisettey et al., 2025).

Early use of devices (12-24 months) emerged as the single most important factor to predict speech and language delay in a UAE based case control study, where 90.3% of children in the delayed group were device users (Al Hosani et al., 2023). In India, a population-based study found that children under five years of age are at high risk of excessive screen time (73%) and that language and communication delays were directly and significantly linked to higher exposure time (Varadarajan et al., 2021). The study findings are relevant to the current study, especially in reference to South Asians and Middle Eastern people who have cultural and/or ethnic backgrounds that are more similar to Pakistan than most studies in the West.

Parental Technoference and the Disruption of Contingent Caregiving

Parents' screen use is an important but often overlooked aspect of the parent-screen communication dynamic. It has come to be increasingly clear from the research literature that not only does the child's own screen-time cause a developmental hazard but that the screen-time exposure of caregivers around the child also causes a hazard (known as "technoference"). A scoping review of 12 studies revealed consistent findings that parents who are absorbed in their devices were linked to a decrease in caregiver sensitivity and responsiveness during the parent-child interaction, with such an effect being more pronounced when parents were absorbed in their devices (Braune-Krickau et al., 2021). In the study, 52 parent-child dyads were observed on a digital distraction, paper-pen distraction, and a control condition (no distraction); the quality of interaction was found to be significantly poorer in both distraction conditions compared to the control condition, with no significant difference between the two distraction conditions (Chaman et al., 2024). The result of this finding is that it is not possible to tell a simple story about the screen as the cause of harm and instead suggests a family systems approach to the problem in which both

the child and the caregiver are impacted by screen cultures. This framing is also supported by preschool research, which found that increased screen time was negatively associated with language scores, and with closeness between the child and parent, as language was indirectly linked to closeness with parent via shared reading and quality interaction (Gath et al., 2023). Taking into account this broader system is crucial for the clinician dealing with an overwhelming child-central family where extended family dynamics are shifting, nuclear family stresses are increasing and mothers and fathers' use of their smart phones has been rising rapidly in Pakistan – perhaps as much as the direct work with the patient child.

The Emerging Concept of Virtual (Screen-Induced) Autism Defining the Construct

One of the most clinically relevant advances in this area is the emergence of the term "virtual autism" to describe a clinical picture in which children exposed to heavy early screen use (usually four or more hours per day) develop a syndrome of social withdrawal, language delay, lack of joint attention, and repetitive, screen-dependent behaviours that closely resemble Autism Spectrum Disorder (ASD). The most important difference with this presentation is its apparent reversibility: in many of these children, symptoms significantly improve or go away after screen time is stopped and intensive therapeutic intervention and structured dyadic interactions are implemented. Clinically and theoretically important, this reversibility is. It implies that developmental pathway was influenced not just by the neurobiology, but by environmental input – and that that can be influenced— and reshaped – and reshaped.

The theoretical case for virtual autism was developed by Harlé, (2019a). He applied Bradford-Hill criteria in his arguments that clinical and empirical evidence endorses the relationship between intensive early screen exposure and subsequent ASD-like symptoms in children under the age of six. Importantly, Harlé found that physicians were referring to cases of "recovery or

dramatic improvement” when parents agreed to limit or completely remove screens from their homes for several months and implemented the structured dyadic interaction, which, through repeated evidence, has been shown to be effective and without negative side effects. Conceptual contribution that comes from this is a shift in thinking of what is traditionally seen as a neurodevelopmental disorder, or at least a phenomenon that is not distinguishable from the same, towards an environmentally mediated and potentially reversible one.

Clinical Evidence for Recovery Through Intervention

The most direct clinical evidence for the reversibility of virtual autism symptoms also discussed in a descriptive study which was conducted in Islamabad, Pakistan by Nasir et al., (2023). For 10 months to one year, 30 children under 10 years of age with over 5 hours of screen time a day, with a diagnosis of autism based on the ADOS, were given speech therapy and behavioral intervention. Children were speech and behavioural therapy for 30 months to one year, with 30 children under 10 years of age, all of whom had a diagnosis of autism based on the ADOS, and were spending more than 5 hours per day on screens. The amount of screen time was also capped at 30 minutes or less per day. 80% of those children who were enrolled at the time of the initial assessment no longer did so at reassessment on the ADOS. The finding that this effect is most evident in children under 5 years is consistent with the critical period literature, and has direct implications for the design of clinical interventions at different ages. Nevertheless, this is a small study of the Pakistani context, and its qualitative aspects – the experience, structuring and adaptation of the therapeutic process of the clinicians – are completely missing from the published study.

These results are supported by literature on case studies. In Indonesia, a case study of a 3.5-year-old child with screen-attributable speech delay showed

that after 6 months of speech-language therapy and the reduction of screen time and an increase in face-to-face interaction with caregivers, there were significant improvements in word completion, articulation, vocabulary, and social engagement (Nurkhamidah et al., 2024). Three case reports from Serbia presented children with language delay, who did not have any other risk factors identified, all of whom had a history of intensive early digital exposure, further illustrated the profile and its sensitivity to early environment change (Simonović & Hinić, 2024). These cases come together to create a converging set of clinical evidence that, though not yet as strong as that which can be offered by randomised controlled trials, is compelling enough to call for immediate research into the clinical strategy being used by practitioners to achieve these recoveries.

Differential Diagnostic Complexity

The virtual autism construct also poses a huge challenge for practitioners in Pakistan on a regular basis – the challenge of differential diagnosis. In clinical practice, it is not easy to distinguish between social communication delay due to screens and idiopathic ASD. They both have a similar surface form of social withdrawal, language delay, and decreased joint attention. However, their causes, risk of recovery, and best management strategies are very different. A thorough examination of problems in the diagnosis of autism reveals that autism is often co-occurring with other neurodevelopmental presentations, that some children may improve or recover from autism after treatment, and sociocultural and economic conditions play an important role in the process of children reaching a diagnosis (Hus & Segal, 2021). Stigma associated with neurodevelopmental conditions often hinders help-seeking, there is limited diagnostic infrastructure, often no trained professionals in place, and standardised tools are used without being culturally validated, particularly in Pakistan (Saeed et al., 2021). Here, the clinical challenge of differentiating virtual and idiopathic autism and

adapting interventions will depend more on technical expertise, clinical judgment, and contextual knowledge and practice.

Therapeutic Frameworks for Social Communication Delay The Evidence Base: Naturalistic Developmental Behavioural Interventions

Over the last 20 years, there has been a significant expansion of the evidence base for early intervention for social communication delay. The results of the meta-analysis of 19 RCTs of parent-mediated interventions for children (aged 1-6 years) with ASD showed moderate level evidence for reducing the severity of ASD symptoms and communication-language outcomes, with an average effect size of Hedges' $g = 0.23$, across domains (Nevill et al., 2018). This body of work has been refined and extended through the development of the family of approaches known as Naturalistic Developmental Behavioural Interventions (NDBIs) which combine developmental and applied behaviour analytic principles, delivered in a natural setting, and using everyday activities as the therapeutic medium. Moreover, there are other two models which have the best evidence base for toddlers with social communication delay are the Early Start Denver Model (ESDM) and Joint Attention, Symbolic Play, Engagement and Regulation (JASPER). A systematic review of 19 JASPER trials revealed that most studies indicated significant improvements in joint attention, joint engagement, play skills, and language skills in children following JASPER compared to controls (Waddington et al., 2021). Importantly, studies on the mechanisms of change identified that the intervention's impact on joint engagement accounted for 69% of the effect on joint attention, and that the impact of the intervention on joint attention, in turn, predicted improvement in both receptive and expressive language (Shih et al., 2021). This mediational pathway is important to consider when thinking about intervention with screen dominant toddlers, as a possible proximal mechanism by

which screen exposure can negatively affect language development.

Furthermore, in a mixed-methods systematic review and meta-analysis of 25 studies of interventions using ABA, there were significant gains for adaptive behaviour (SMD = 0.31), daily living skills (SMD = 0.36), language skills (SMD = 0.42), and joint attention (SMD = 0.27) with greater gains in language skills (SMD = 0.72) when using high-intensity interventions versus low-intensity interventions (Han et al., 2026). Additionally, qualitative results in this review revealed that some of the major barriers that continue to exist are financial restrictions and low-quality training, which are particularly pronounced in the context of Pakistan.

Parent-Mediated Interventions and Their Relevance to Resource-Constrained Environments

One common theme in the intervention literature has been the importance, if not the necessity, of interventions mediated by parents, especially when access to a specialist clinician is sparse. Nearly 90% of families in a large community implementation study of Social ABCs parent mediated programme completed the 12-week programme and toddlers' improvements in language and communication skills were found to be directly related to the strategies used by parents (Brian et al., 2022). A systematic review of 54 family-mediated social communication intervention studies have identified Pivotal Response Treatment (PRT), ESDM, and JASPER as established evidence-based practices, with telehealth delivery which is emerging as a hopeful modality for extending reach (Pacia et al., 2022). Survey research with 264 SLPs who work with children under 3 years of age revealed that the majority of SLPs were already implementing naturalistic principles in their practice and engaging parents as first agents of change, but further research and training were necessary for best practice (Stronach & Schmedding-Bartley, 2019).

In Pakistan and other similar backgrounds, the WHO Caregiver Skills Training Program (CST) appears to be more relevant. The programme was developed to be feasible, scalable and adaptable to low resource settings and to be delivered by non-specialists, and to address the global treatment gap, with 95% of the world's 52.9 million children under five with developmental disabilities in LMICs (Salomone et al., 2019). Field-testing is ongoing in more than 30 countries. The adaptation and adoption of the programme in Pakistan, however, is only poorly documented, and the specific application of the programme to the screen-dominated toddler profiles has not been evaluated.

Screen Reduction as a Therapeutic Variable

Another aspect of intervention that has not been adequately studied systemically is the intervention of reducing the amount of screening, beyond the formal speech and language therapy or behavioural intervention. A quasi-experimental pilot study conducted in Pakistan showed that eliminating all screen time, and fewer than 30 minutes, for 90 days, without providing other formal therapy, resulted in a statistically significant improvement in vocabulary scores, compared to the control group who had continued with their normal screen time (Rashid et al., 2025a). The discovery indicates that reducing the screen can be a valid therapeutic tool, especially at the beginning of the interventions. But this opens up crucial questions of implementation: how do clinicians discuss screening reduction with families, how do they deal with the resistance by the families, how do they track adherence, and how do they fit screening reduction into formal therapeutic work? These questions are not addressed in the quantitative literature. Furthermore, in another study conducted in Islamabad also documented that out of 80 children already enrolled in the speech therapy, the correlation coefficient for severe screen exposure groups (more than 2 hours daily) was $\chi^2 = 69.073$ ($p < 0.001$), with more severe speech impairments (M. Ali et al., 2025). In

summary, these results indicate that screen behavior during the course of the intervention is not simply a background factor, but also a direct effect on therapeutic outcomes, and thus should be targeted by practitioners.

The Context of Clinical Practice in Pakistan

Clinical situations in Pakistan represents in a context that includes structural and cultural factors which have a significant impact on the challenge and practice of intervening with screen dominant toddlers. In major child development centres, one-third of all child developmental disability referrals were for ASD (one tertiary care centre in Karachi), and an increasing trend was observed in the last decade (2012-2021). Despite this burden, there are major systemic barriers. A survey conducted in Pakistan revealed that there is a lack of trained speech professionals, a high level of stigma in the community, a lack of quality therapy services, and a high degree of economic difficulties, especially in low income communities (Jafri et al., 2023). In another study it was found that the primary challenges facing Pakistani mothers with children diagnosed with ASD are delayed diagnosis, lack of professional support, financial difficulties, and social stigma (Mushtaq et al., 2024; Shaikh et al., 2026). These structural realities do not merely provide background rather they dynamically shape the therapeutic encounter: These realities determine what interventions are feasible, and how do these families understand and engage with their recommendations, and what adaptations practitioners must make for according to the standard protocols.

The evidence review by Marlow et al., (2019), about screening tools for developmental delay and ASD for use in LMIC settings, concluding that the majority of the screening tools used were developed in Western cultural contexts and require extensive adaptations for validity and feasibility in the LMIC context. Likewise, culturally appropriate interventions within SE Asia also rely on, culture-specific adaptation, raising public awareness and incorporating ASD

services into primary healthcare systems (Kumar & Bhattacharya, 2024). These observations highlight the fact that although the above mentioned therapeutic approaches, which are well-supported in Western countries, may not be directly applicable to Pakistani clinical contexts.

In fact, it is the role of qualitative inquiry to understand how practitioners conduct themselves in this translation.

Summary and Synthesis

The following points, some of which were shared by the literature reviewed in this section, have direct relevance to the present study. First, the evidence that early and intensive screening exposure is detrimental to the development of social communication skills is now large, crossculturally replicated and neurobiologically plausible. Second, the idea of virtual autism is not a recognised syndrome or a formal diagnosis, but a phenomenon that is both clinically real and potentially reversible, and is especially prevalent in Pakistani clinical practice, based on two local studies published by Islamabad and Karachi. Third, therapeutic approaches that have demonstrated a consistent evidence base for social communication delay, such as NDBIs, parent-mediated interventions and screen reduction protocols, have been well documented regarding outcomes but have not been well documented regarding the therapeutic processes, adaptations

and practitioners' reasoning for their application, especially when working with children in under-resourced and non-Western settings. The present study aims to fill this gap between the theory and practice of using ICTs with children from screen-oriented toddlers in Pakistan.

Findings Overview and Participant Profile

This section presents the findings of the study. The data came from the answers of eight clinicians. All of them work with toddlers in Pakistan. Their views were analysed thematically. Eight themes have emerged from this analysis. The themes describe how clinicians recognise, diagnose, treat, and track screen-induced social communication delays. They also describe the barriers that clinicians often face in their daily practice. Each theme is discussed below. The participants formed a small yet varied group. They worked in four cities. Five practised in Lahore. One each practised in Islamabad, Karachi, and Multan. Their professional roles also varied. The group included behavioural therapists, a behaviour analyst, an occupational therapist, a speech-language pathologist, and a senior special educationist. Their clinical experience also ranged from one year to ten years. Table 1 summarises the sample. Participants are recognized through codes, in this study, from P1 to P8, in order to keep their identity hidden.

Table 1. Profile of participating clinicians

Code	Professional Role	City	Experience (years)
P1	Senior Special Educationist	Multan	10
P2	Behavioural Therapist	Lahore	1
P3	Behavioural Therapist	Lahore	3
P4	Behavioural Therapist	Lahore	2

P5	Occupational Therapist	Islamabad	2
P6	Behaviour Analyst	Lahore	2
P7	Behaviour Therapist	Lahore	2.5
P8	Speech-Language Pathologist	Karachi	2

The depth of their views varied. Some participants gave brief answers. Others have given detailed descriptions. The analysis therefore draws deeply on their complete views.

Theme 1: Reversibility as a Diagnostic Compass

A clear first theme was the use of screen removal as a diagnostic test. Clinicians often meet toddlers who appear autistic. These children show poor eye contact, little speech, and weak social interest. The clinicians needed a way to tell two groups apart. One group has innate autism. The other has a screen-induced delay. Several participants described the same simple method. They remove screens completely for a set period. Then they watch what happens. Participant P7 described this method most clearly. He called it a screen fast. He stated the logic in plain terms: remove screens for two to three weeks; autism traits stay, while screen-induced traits fade. Participant P4 used the same idea. He spoke of starting with zero screen time and watching the consequences. Participant P8 also advised clinicians to watch for the signs and cut the screen gadgets first.

The participants then described the contrast they look for. In innate autism, the signs stay stable. P2 noted that core autism signs are present consistently across settings. P5 observed that in such children social engagement remains low across sessions. Gains are slow even with effort. In screen-induced delay, the picture changes quickly. P2 reported that these children show better social responsiveness once screens are removed. P7 noted that eye contact and smiles return when screens are gone. He added that large improvements often appear within two to four

weeks. For these clinicians, the speed of recovery was the key diagnostic clue.

Theme 2: The Behavioural Signature of Screen Dependence

The second theme was a shared description of the clinical profile. Participants listed the behaviours they see most often in screen-dependent toddlers. Their lists overlapped strongly. The most common signs were reduced eye contact and poor response to name. Many also named a lack of pointing. P7 called this an absence of declarative pointing. He explained that the child does not point to show things to others. Weak joint attention was reported across nearly all accounts. Speech problems were also central. Participants described delayed or absent words. Several noted scripting, or echolalia. P7 described children who script from shows instead of talking to people. P6 listed repetitive watching and a clear preference for screens over people. A short attention span was common. So was irritability when the screen was removed. P8 summed up this cluster as tantrums, poor eye contact, and no interaction with peers. Two further observations stood out. First, participants described passive engagement. P2 noted that these children watch content but do not actively communicate or imitate. The child is busy, yet not connecting. Second, P6 described a striking pattern. The child is silent at home but active with the screen. The same child who ignores people will respond to a phone. This contrast helped clinicians spot the screen-driven nature of the delay.

Theme 3: The Displaced Mother Tongue

The third theme concerned language. The study asked about English-language content, such as Cocomelon. Participants linked heavy exposure to weak native-language growth. They reported that toddlers often learned English words first. P7 gave a clear example. The child says the English words before the Urdu equivalents. Participants also reported weak Urdu comprehension. P7 noted that such children struggle to respond when spoken to in Urdu. P6 described confusion between languages and the repeating of phrases from videos.

The more detailed accounts offered an important caveat. They argued that English itself was not the main problem. The real problem was the loss of interaction. P5 stated this directly. The main issue, she explained, is not English but reduced caregiver-child interaction in the native language. P2 made the same point. She noted that screen content lacks interactive feedback. For this reason it does not support natural language learning. In this view, the screen does not teach language. It only displaces the live talk that does.

Theme 4: Out-Competing the Screen – The Engagement Toolkit

The fourth theme was the richest. It covered the techniques that clinicians use to win a child's attention back from the screen. Three connected strategies appeared across the accounts. The first strategy was to follow the child's lead. Participants avoided forcing eye contact. Instead, they made the child want to engage. P2 described joining the child at eye level and starting with a preferred activity. She then pauses the activity and waits for the child to look or respond. P5 used the same approach. She enters the child's space quietly and avoids direct pressure for eye contact. She then builds turn-taking play so that the child needs her to continue the game. Eye contact is invited, not demanded. The second strategy was the careful use of physical toys. These toys replace the strong pull of the screen. Participants named the same favourites again and again, such as bubbles,

lightup toys, clay, and balloons, etc. The shared logic was important. The best toys give fast and clear cause and effect. P5 described them as highly visual, interactive, and fast-feedback toys. P7 explained why these toys work. Bubbles and spinners create unpredictable movement and need an adult to control them. Therefore, the child must look at the adult to keep the fun going. The toy becomes a bridge to the clinician, not a substitute for one.

The third strategy was to use the clinician's own body. Participants turned their face and voice into the main tool. They used exaggerated expressions and a high, varied vocal tone. They used pauses and surprise. P7 advised going large with the face and voice. He paired this with traditional Urdu rhymes, such as *Machli jal ki rani hai*, adding a tickle on the last word. He named the key advantage of the human over the screen. A screen cannot react to the child's glance, but a clinician can. P5 described building social mini-stories that are emotionally rich, fast-paced, and interactive. The aim was to be more rewarding than the video.

Theme 5: Carrying the Work Home – Parent-Mediated Strategies

The fifth theme was about the home. Clinicians knew that clinic time was short. The real work happened with the family. So they coached parents in simple, daily strategies. A common strategy was structured replacement. Parents were taught to swap screen time for fixed activities. P5 described a method of gradual replacement, structured routine, and consistent calm responses. Parents target the hard moments, such as meals, boredom, and sleep. Participants offered creative and culturally grounded tools. P7 described a Replacement Box. It holds bubbles, dough, and pots and pans. The parent offers it only when the child demands the phone. He also described a removal ritual that he called phone janaza. The child helps to put the phone in a drawer and says a farewell. The ritual helps the child accept that the phone is gone. Other advice was simpler. Participants stressed physical and outdoor play. P8

recommended cycling, blocks, clay, and colouring together. P7 advised swapping screens for a grandmother's lap, Urdu rhymes, and daily trips to the park or roof.

A clear message ran through this theme. Parents were told to stay calm but firm. P5 trained parents to manage tantrums with distraction and praise, not conflict. P7 advised families to keep all adults on one rule and to ride out the first three difficult days. The early days were expected to be hard.

Theme 6: The Joint Family System as the Central Barrier

The sixth theme was the strongest barrier. Almost every participant named the joint family and the busy household. The core problem was inconsistency. Many adults care for one child. They follow different rules. P5 explained the result. Even if one caregiver cuts screen time, others may still use it to calm the child. This breaks the plan.

Elders were often the source of this break. P7 described it bluntly. Elders give the phone to stop the crying. One person's wish to quiet the child can undo weeks of work. P8 described fathers and in-laws who over-pamper the child. This made tantrums worse. A lack of awareness added to the problem. P2 noted that families often did not know the effects of screens. P6 listed a common belief that the child will simply grow out of it.

Social pressure also played a part. Parents felt shame when a child had a public tantrum. P7 noted that this shame makes parents give in. The burden often fell on one person. Several accounts pointed to the mother. P8 described a wider family strain. He spoke of fathers with no separate time for the family, and of a resulting cycle of disappointment. For these clinicians, treating the child meant managing the whole household.

Theme 7: Markers and Timeline of Recovery

The seventh theme described progress. Participants agreed on the first sign of recovery. The child begins to turn from the screen to the face. P7 named this social checking. The child

glances at the adult's face to see the reaction. P5 described brief eye contact during interaction as the first clear sign. P2 listed increased eye contact and response to name. P1 described it simply: the child wants to share his thoughts. Shorter tantrums were another early sign. P7 noted that tantrums grow shorter when the phone is taken away. Views on the timeline varied. The richer accounts reported fast early gains. P7 reported small wins within three to five days. He expected meaningful change within two to three weeks of strict, daily effort. P5 and P6 gave a staged picture. First signs appear in one to two weeks. Stronger gains take six to twelve weeks. P2 gave a similar range, with first change in two to four weeks and clearer progress in one to three months. One account was more cautious. P8 felt that heavy, long-term users may need many months or longer. The pattern depended on the child's screen history and on family consistency.

Theme 8: A Caregiver-Driven Phenomenon

The final theme was a cross-cutting insight. Several participants argued that screen dependence at this age is driven by adults, not children. P5 stated it plainly. In Pakistan the problem is more caregiver-driven than child-driven. The phone is given to feed, to soothe, or to quiet the child. The child then learns to self-regulate through the screen rather than through people. P2 made a similar point. Screen use becomes a substitute for caregiver interaction, especially in busy homes. P7 placed this in a cultural frame. Phones are given during meals and social gatherings. The child then links food and family events with screens. P6 added a warning for diagnosis. Such delays are often misinterpreted as autism before the screen history is explored. The message from the clinicians was consistent. The screen is a symptom of a family pattern. So the family pattern, and not only the child, must be treated.

Discussion Overview

This section interprets the findings. It links them to the existing literature. It then draws out the

implications for the clinical practice and policy. The findings offer a rare view of real clinical work. Most prior research measures outcomes. This study describes how clinicians think and act. Four points stand out. First, clinicians treat reversibility as a diagnostic tool. Second, their hands-on methods mirror established intervention science, often without naming it. Third, they frame the problem as a family-system issue. Fourth, they face barriers that are specific to the Pakistani context.

The Screen Fast as Lived Differential Diagnosis

The foremost finding was the use of screen removal to separate innate from screen-induced delay. This practice has strong roots in the literature. Harlé (2019) argued that intensive early screen exposure can cause autism-like symptoms in vulnerable young children. He also noted that many cases improve when screens stop and dyadic interaction begins. The clinicians in this study turned that idea into a working test. Their screen fast is a practical version of Harlé's claim about reversibility. The local evidence supports this approach. Nasir et al., (2023) found that 80% of screen-exposed children in Islamabad no longer met autism criteria after therapy and screen reduction. Rashid et al. (2025) found that cutting screen time alone raised vocabulary in children with speech delay. The present findings add the clinician's view to these outcome studies. Clinicians do not only reduce screens as treatment. They also use the child's response to screen removal as information. This is a subtle but important addition. It suggests that screen reduction has both a therapeutic and a diagnostic function. The literature has not yet framed it in this way.

However, caution is needed. Distinguishing the two profiles is difficult in practice (Hus & Segal, 2021). A short screen fast is a useful signal, not a final diagnosis. The risk of false reassurance is real. A child with true autism still needs full assessment and care. The findings should therefore inform careful assessment, not replace it.

Intuitive Use of Naturalistic Intervention

Principles

The engagement techniques were the richest finding. They also map closely onto formal intervention models. The clinicians described following the child's lead, using play, and building joint attention. These are the core features of NDBIs. Other models such as the ESDM and JASPER are also built on these same ideas (Waddington et al., 2021; Pacia et al., 2022). Yet most participants did not name these models. They appeared to apply the principles from experience alone. The focus on joint attention is especially telling. Participants worked hard to move the child from the screen to the face. This matches the science of how these models work. Shih et al. (2021) found that joint engagement drives most of JASPER's effect on joint attention. Improved joint attention then predicts language gains. The clinicians' instinct to pursue eye contact and shared play is therefore well founded. Their choice of toys also fits this logic. They selected toys with fast cause and effect that require the clinician's help. This keeps the adult in the loop. It builds the very joint engagement that the literature identifies as the active ingredient.

The use of the clinician's face, voice, and rhymes adds a further layer. Screens give strong, fast reward but no response. The clinicians offered something a screen cannot: contingency. This echoes the technofence literature. Brushe et al. (2024) showed that screen time reduces the back-and-forth talk that builds language. The clinicians' answer is to flood the child with that missing back-and-forth. Their use of Urdu rhymes also shows cultural adaptation in action. They translate global methods into local form.

Treating the System, Not Only the Child

A strong theme was the family as both cause and barrier. This fits a growing body of work. The technofence literature shows that caregiver screen use harms interaction (Braune-Krickau et al., 2021; Chamam et al., 2024). The present findings extend this idea. Participants saw screen

dependence as caregiver-driven. The phone is a tool for feeding, soothing, and crowd control. This view reframes the target of treatment. The child's screen use is a symptom of a household routine. The joint family also emerged as the obstacle. This matches the Pakistani literature on autism care. Studies report stigma, low awareness, and family strain (Jafri et al., 2023; Mushtaq et al., 2024). The participants showed how these forces play out day to day. Elders give the phone to stop crying. Rules differ between caregivers. Mothers carry most of the load. This is a clear contrast with many Western parent-mediated models. Programmes such as Social ABCs assume a single primary parent agent (Brian et al., 2022). In a joint family, many agents act at once. An intervention that trains only the mother may fail. The findings suggest that whole-family coaching is needed. This points to the value of scalable, low-resource models. The WHO Caregiver Skills Training programme was built for such settings (Salomone et al., 2019). It is designed for non-specialists and for families. The creative tools described here, such as the Replacement Box and phone janaza, could enrich such a programme. They are low in cost. They use household items. They fit the local culture. They could be tested and shared more widely.

The Question of Language

The findings on language need careful reading. Participants linked English content to weak Urdu. They often used the idea of language confusion. This folk model deserves scrutiny. The broad evidence does not show that bilingual exposure alone causes delay. Some studies suggest that multilingual children are not at higher risk. The more expert participants agreed with this view. They located the problem in lost interaction, not in English itself. This aligns with Brushe et al. (2024) and with reviews showing that co-viewing and interaction are protective (Xie et al., 2024). The lesson for practice is clear. Clinicians should reassure families that the home language is not the

enemy. The goal is more live talk, in whatever language the family uses well.

Implications for Clinical Practice

There are several practical lessons follow. First, screen history should be a routine part of developmental assessment. The warning that delays are misinterpreted as autism is important. A simple question about screen history could prevent error. Second, a structured screen-reduction trial could be offered as an early step. It is low in cost and low in risk. Third, training should make NDBI principles explicit. Clinicians already use these methods.

Naming and teaching them could raise quality and consistency. Fourth, parent coaching should target the whole family, not one parent alone.

Grandparents and fathers must be included.

Implications for Policy

The findings also speak to policy. Public awareness is weak. Many families do not know the risks of early screen use. A national awareness campaign could help. It should use simple, local messages. Primary care could play a role. Screen guidance could be added to routine child health visits. The diagnostic staff is also weak (Saeed et al., 2021). Training non-specialists in caregiver skills could extend access. The WHO programme offers a tested route (Salomone et al., 2019). Finally, screening tools need local validation. Western tools may not be fit for the sub continent family's culture (Marlow et al., 2019; Kumar & Bhattacharya, 2024). Policy should support this adaptation work.

Conclusion

This study explored how clinicians in Pakistan treat screen-induced social communication delay in toddlers. Eight clinicians shared their accounts. Eight themes emerged. Clinicians use screen removal to tell innate autism from screen-induced delay. They recognise a clear behavioural profile. It is marked by poor eye contact, weak joint attention, and lost speech. They see English screen content as a sign of lost interaction, not as the root

cause. They win attention back through child-led play, cause-and-effect toys, and rich use of their own face, voice, and rhymes. They coach parents in simple home routines, including creative local tools. They identify the joint family as the main barrier to consistency. They read recovery through the child's first turn from screen to face. And they see the whole problem as caregiver-driven. Taken together, these findings describe a skilled and adaptive practice. The clinicians apply global intervention principles in local form. They often do so without formal labels. They treat the family system, and not only the child. This study gives that hidden practice a clear voice.

This study has several limits. The sample was small, with only eight participants. Most worked in Lahore and most were behavioural therapists. Other roles and cities were thinly represented. The data came from written, open-ended responses rather than face-to-face interviews. This limited the depth of the accounts and the chance to ask follow-up questions. The richness of the answers also varied. Some were very short. The analysis therefore leaned on the fuller accounts. The study relied on clinician self-report. It did not measure child outcomes. It did not include parent views or direct observation. The findings should be read as exploratory. They cannot be generalised to all Pakistani clinicians.

There are several next steps which are required to be followed in this area. Future work should use larger samples and in-depth interviews. This would deepen and test the themes found here. Prospective studies could test the screen fast as a formal diagnostic step. They could measure how well an early response predicts later outcomes. Controlled trials could test screen reduction as a stand-alone treatment. Researchers could also study whole-family coaching, designed for the joint family. The creative local tools described here deserve formal testing. Finally, screening and outcome tools should be validated for Pakistani use. This body of work would move the field from description towards evidence-based and locally relevant guidance.

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